DRAGON USER

International edition

The independent Dragon magazine

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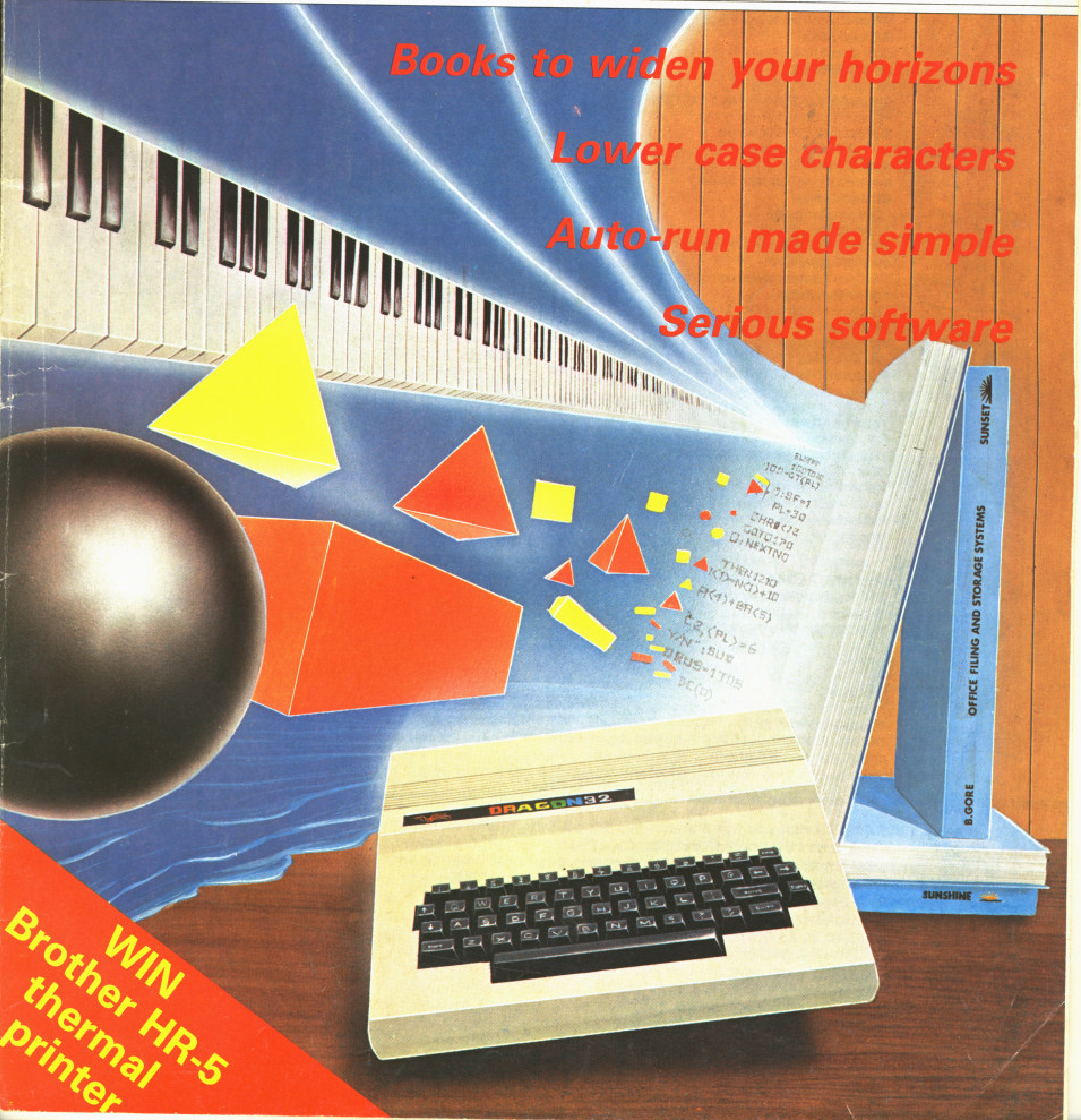
July 1984

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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extend, depend on the quality of the discoveries that you can make with your Dragon. The Dragon 32 computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Every one of us who uses a Dragon will be able to discover new tricks and quirks almost every day. To help other Dragon users keep up with the speed of the development each of us must assume that we made the discovery first — that means writing it down and passing it on to others.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents

Editorial

SAD NEWS came from Dragon Data at the beginning of June. The company announced that the receivers had been called in following "the continuing difficulties of establishing profitable trading in the UK and other parts of the world".

Obviously this threatens the future of the new Dragon Professional, previewed on page 9 of this issue. But the company says it "has confidence in its new products and the market opportunities they represent and will be using its best endeavours in helping the receivers to explore ways of continuing trading".

The company has been no stranger to stories of financial problems. It was last September that a £2½ million funding was announced for Dragon Data. At the time the company insisted that this sum was primarily an investment, but outsiders saw it more as a rescue package. At the time the difficulties were attributed partly to poor sales last summer. The message at the beginning of this June was similar but not restricted to a specific season: "The home computer market was not as buoyant as people believed." Earlier this year British Home Stores decided to stop selling the 32 and cleared its shelves by selling the machine at a bargain basement price. Rival chain store Boots, responsible for so many Dragon sales, was also expected to drop the 32 but to continue selling software for the machine.

The 32 is an old micro now in microcomputing terms and was unable to resist the challenge of newer machines. The time taken to release disk drives hindered the 32's growth while the 64, an attempt to move upmarket, was little more than an upgraded 32. A further delay, between the arrival of the 64 and the applications software to run on it, did further damage.

Sadly a wheel has now turned full circle. The 32 was developed by toy-maker Mettoy which, faced by its own financial problems, sold rights to the machine to the newly formed Dragon Data. Last October, nearly a year later, Mettoy called in the receivers. Now the same fate has befallen Dragon Data.

Please note that as *Dragon User* is an independent publication we will not be effected by Dragon Data's financial problems.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2R 3LD.

Maze defence

YOUR reviewers do a great job with limited time to examine all the games they are sent, but it is a little annoying for a small company trying to do something about the quality and price of Dragon cassettes, to find its offering criticised for features which have specifically been taken care of.

The reviewer of "Witchway" (software review May 1984, *Dragon User*) complained of being "squashed" too frequently by the walls of the maze, with the consequent tedium of waiting for the game to re-initialise. However, there is a command listed in the instructions which prevents this happening, and both my 7- and 4-year-old sons have no trouble in using it in time.

In fact, "Witchway" was deliberately designed so that the player is rarely killed at random and should have a long playing time. The wait to restart then comes as more of a welcome rest!

However, just in case this should still be an irritation to some, I have now taken care of it by omitting certain sections of initialisation on subsequent games (unless the difficulty level is altered). I have also now disabled the BREAK key in sections where its inadvertent use would wreck the screen display, and CONT would be useless.

Ian Murray-Watson
Peterchurch
Herefordshire

Audible humming

JUDGING by the editorial and one of the articles in the May '84 edition of *Dragon User*, it's obvious that I am not the only one to have had trouble with the Dragon cassette interface.

In my case the problem was caused by having the microphone, playback and remote lines permanently connected, which caused an earth loop. (Evidenced by a humming when using the "audio on" command.)

The solution was to use only one connection at a time (for example using only the microphone line when saving a program). This does mean that the tape has to be started and stopped manually, and plugs have to be changed, however, my loading errors have gone away and so I feel this is a small price to pay.

J H Cox
Aberystwyth
Dyfed

Personal problem

I AM writing to you to complain about the Pan Personal Computer News book *Sixty Programs for the Dragon 32*. My complaint is about the listings — some programs have lines left out and others have the wrong commands. At the price of £4.95 I should have thought that there would be no errors in the book.

If anyone has the book and has managed to correct the error in the Galaxians program could they please send me the correct listing.

Philip Coe
Cantril Farm
Liverpool

WE HAVE had several queries concerning the listings published in *Sixty Programs for the Dragon 32* and have been in contact with Pan Books about the problem.

They assure us that they are aware of the errors, which, according to David Kewley of Pan Books, occur in five of the listings. The situation arose, he said, because most of the listings in the book were converted from other micros to the Dragon.

Pan has a full-time buyer support system which will investigate possible program errors, and a correction sheet containing error free listings of the five problem programs is available from Elizabeth Kinnel, Pan Personal Computer News, Computer Library, 18 Cavaye Place, London SW18.

Mid-air escape

I HAVE discovered something interesting in Microdeal's Cuthbert in the Jungle (Pitfall).

While running along I fell down one of the holes into the Scorpion's Domain. Then when I was climbing up a ladder I jumped off half-way (this only happens very rarely). This meant I was suspended in mid-air — it also enabled me to walk above the scorpions so they could not bite me.

Jevon West
St Albans
Herts

ANY OTHER readers who have noticed "interesting things" happening in games they've played should write to let us know — we're not proud about the ways we get high scores.

Text files

AS WE mentioned in the review of Dragon Data's Record Management System (RMS) in the May issue of *Dragon User*, it is necessary to create text files for the Report and Dictionary functions, but no text editor is included on the RMS disk and indeed Dragon Data suggests the use of either its Stylograph word-processor or the Editor Assembler/Debugger package.

However, even if you do not have either of these two editors (or the BASIC09 disk which includes a text editor), you can still use the BUILD command on the essential OS9 system disk to prepare text files. This is not actually an editor but it does allow you to create text files, although if you make a mistake when using BUILD you have to rewrite the text from scratch.

This is obviously rather frustrating if you only want to use RMS, but it seems unlikely that many users will fall into that category. One of the virtues of OS9 is that it is a complete interlocking system with a common file structure, which can be accessed by any utility, and we would expect users who opt for OS9 to also have at least one other package containing a full editor. We trust that this explains the situation clearly.

Keith and Steven Brain
Penygaer
Cardiff

For book worms

I WOULD like to pass on to readers the title of a book that I have found very useful in helping to understand my Dragon.

Know Your Dragon by Don Monro (published by the Tiny Publishing Company of Haywards Heath) is far clearer and much more easily understood than the Dragon manual, which is both difficult to understand without previous computer experience and in many respects more comprehensive. My own copy came from a Tandy shop, price £5.95, but is presumably available through most bookshops.

D Walton
Kendal
Cumbria

Parisian pen-pal

I AM 16, live near Paris and have been learning English for five years. I would appreciate speaking (or rather writing) "Dragon" with a pen-friend.

We could also possibly make an exchange during the summer holidays.

My father is a microsystems engineer, and I am the owner of a Dragon. My address is: 4 Allée du Midi, 94420 Le Plessis-Trévise, France.

Marc Patry
France

Software Top 10

1	(–) Cuthbert in Space	Microdeal
2	(3) Chuckie Egg	A&F Software
3	(1) Dragon Chess	Oasis
4	(7) Kriegspiel	Beyond
5	(6) Eightball	Microdeal
6	(10) Skramble	Microdeal
7	(2) Hungry Horace	Melbourne House
8	(–) Sprite Magic	Knight
9	(–) Space Shuttle Simulator	Microdeal
10	(–) Sprint	Oasis

Chart compiled by Websters Software



Games that come from...
BEYOND
CHALLENGING SOFTWARE
UP PERISCOPE
PROTECT the convoy using SONAR + Depth charges to seek out and destroy the enemy below!
Try and pick off your Enemy from below the waves!
Kriegspiel
...How much longer can we hold this town...?
Here comes the first flakes of snow and out of it – their Tanks!
KRIEGSPIEL: A thrilling game of strategy to be played against the Dragon or any other devious opponent.
PLEASE SEND ME...
Kriegspiel £6·95
UP PERISCOPE £6·95
QUANTITY
all prices include p&p
TOTAL
£
I enclose a Postal Order Cheque payable to BEYOND, OR charge my credit card.
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Wellington House, Upper St. Martin's Lane, London WC2H 9DL.

Expanding network

SEVERAL more user's groups have sprouted up all around the country as the Dragon clubnet continues to expand.

From Ashley Adamson comes news of the Independent Romsey Area Dragon User Group which has regular meetings every weekend and issues a free, fortnightly newsletter. For further details contact Ashley at St. Elmo, Slab Lane, West Wellow, Romsey, Hants SO5 0BY.

Club Secretary J Smith sends details of the Brighton, Hove & District Computer club which meets every second Wednesday at the Southwick Community Centre from 7.30 pm to 10.00. The club has members of all ages with a wide variety of machines and interests and you are asked to contact The Hon Secretary, 30 Leicester Villas, Hove, East Sussex BN3 5SQ for further information.

Fred Belfield writes with news of his intended Worldwide pen pals club for the Dragon. A magazine/newsletter is planned and Dragon Data has promised to help with an offer of discounts on some of its products. Enquiries by post should be sent to 57 Stour Hill, Quarry Bank, Brierley Hill, West Midlands DY5 2AT.

Games and adventures

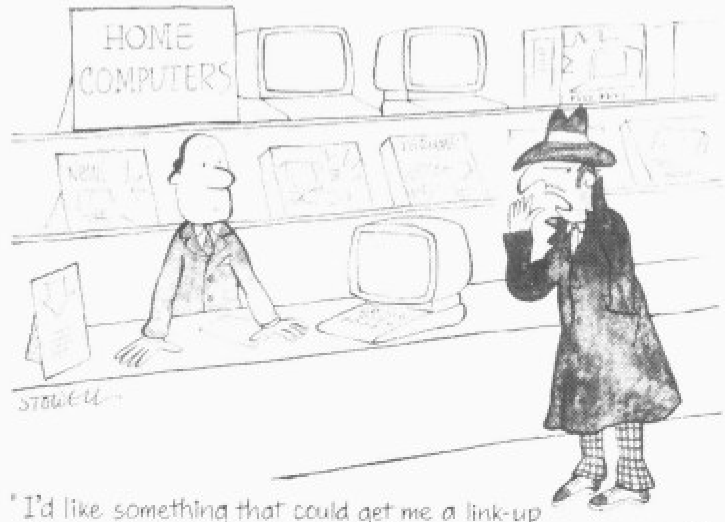
ASTROLOGICAL predictions, a simulated space walk and an invisible magic ring are all essential ingredients in the latest releases of software for the Dragon.

From Magno Software comes Belvedere Castle Adventure which has you searching through 130 locations on the trail of gold bullion; It's a Knockout, a three part game for one or two players involving overcoming obstacles as is attempted in the TV series of the same name; and Jack the Builder a 100 per cent machine code game with four different levels of play as you construct a house avoiding cement bags and the efforts of a stone intent on demolishing your hard work.

All three cassettes cost £6.95 including p&p and are available direct from Magno Software at 10 Piermont Road, London SE22 0LN.

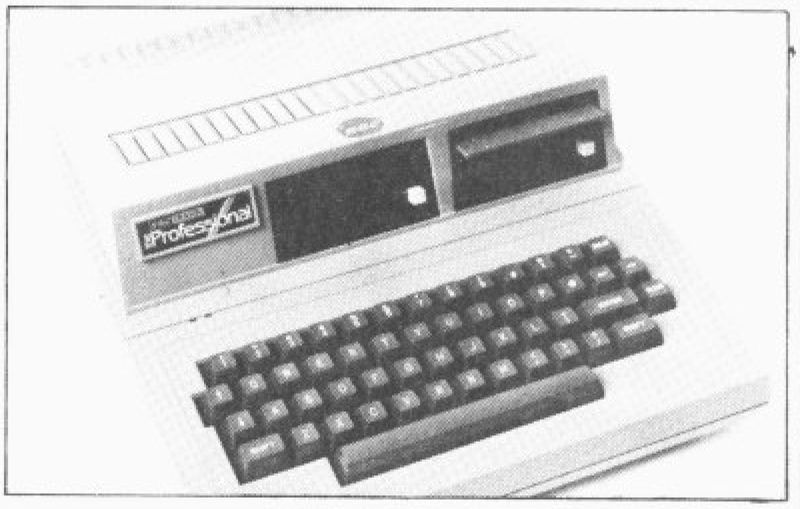
"An original space shoot 'em up" is how Michael Moss of Imagine Software described Imagine's latest game for the Dragon entitled Cosmic Cruiser. Billed as a better game than Pedro (also from Imagine) the idea is to rescue colleagues held prisoner in a space station and return them safely to the space ship avoiding and blitzing all sorts of nasties that get in the way.

Finally from Dragon Data comes Astrology, which takes a serious look at the subject, with two different charts, five different house systems and requires such details as the longitude and latitude of your place of birth.



"I'd like something that could get me a link-up with the World Bank System in Zurich without too much hassle!"

GEC Dragon moves into top gear



DRAGON DATA is moving into the top league with the launch of two new micros, project named Alpha and Beta.

The Alpha, to be marketed by GEC Dragon under the probable title of the Professional, is an upgraded and re-tooled version of the Dragon 64. It uses the 6809E processor, has 64K Ram, 16K Rom plus 8K boot Rom and will support one or two 3½ inch single sided, double density Sony micro drives with 360Kbyte formatted capacity, and 500K unformatted capacity.

Display is either 32 by 16 columns in Basic mode, 51 x 24 or 40 x 24. The colour capabilities are the same as for the 64 and depend on the mode chosen. An on board programmable sound generator allowing use of three independent sound channels, and a noise channel are included.

The Professional has a cassette and joystick port, a Centonics parallel interface, an RS232, an RGB and composite monitor socket, a UHF moderated signal and on board power supply. On power-up, you are asked whether you want to use Basic or a load operating system from disk. An on board floppy disk controller gives the additional capacity to run two external 5¼ inch disk drives.

The Professional also has a built-in modem which is "going through approval" with British Telecom according to Derek Williams, Dragon Data's technical director. The machine is expected to cost about £700 for one drive and £850 for the two drive version.

The Alpha comes in one neat compact case, and is the approximate size of the 64 with an altered height to incorporate the micro-drives. It connects direct to the mains via a standard 13 amp plug.

Describing the new micro, Derek said we have "improved and expanded the 64 to the optimum" providing a neat package "without wires trailing everywhere". All Dragon 32 and 64 games and applications software are compatible as well as the OS-9 operating system.

New software has also been developed to run on the system including a Rom pack or disk to access Prestel and two other networks, Telecom Gold (PSS network) and Comet Electronic Mailing system (ISTEL). The latter two networks enable telex messages to be sent via a micro.

At present Dragon Data has an off-line editing system to generate a message without incurring phone call charges and utilizing micro-time. Once edited, instantaneous messages can then be sent. This system is to be expanded allowing for a multi-user system.

Project Veta really sees GEC Dragon hitting the big time with an expected retail price in the region of £2,500 to £3,000.

The micro uses twin 6809 chips, has 256K bytes Ram expandable to ¾ of a megabyte and will support two 3½ inch micro drives internally with the possibility of an external unit offering a hard disk in replace of one of the micro drives.

There is an on-board power supply, standard 80 column format display and an 8K boot Rom load operating system from disk. The "Veta" will work with an RGB or monochrome connection and has five different modes: the normal working resolution of 320 by 256 in 16 colours; hi-res 640 x 512 in four colours; 640 x 256 in four colours; 320 x 256 in four colours and a teletext mode of 160 x 72 in eight colours.

The main CPU case has a flat top to support a monitor, and the product will be sold as a system incorporating monitor, CPU and detached keyboard with separate numeric pad.

A Centronics parallel interface, RS232 serial port, mouse input and light-pen facility are included. A mother card is supplied with the system which provides access to supporting applications cards. At present there are three of these:

- A modem system with originate and answer capabilities, and software select baud rates of 300/300, 1200/75 and 1200 in half duplex (if demand warrants there will also be a 1200 full duplex modem system).
- Quad serial port — an OS9 multi-user and multi-tasking system which will support a number of terminals working into the machine.
- Network capability in order to network machines together with one acting as a file saver with a hard disk of up to 80 megabytes.

Other application cards are planned for this "upmarket and extremely competitive product" according to Derek Williams. With its on-board power supply the "Veta" is a "complete working package with all the bits ready to go." Full production of the system is expected to go ahead in July with pre-production models already out.

Dragon Data is presently developing a lot of new products in order to enhance its existing range. When asked about a micro to replace the Dragon 32 following the news that Boots, the High Street retail chain, may pull out of selling the Dragon and is negotiating the future of the 32, Derek Williams would not commit himself. He said simply that "we are going to stay in the High Street", while Steve Davis, Dragon Data's Marketing Assistant said that the 32 is popular overseas and that Dragon Data will continue to market the 32 as long as there is a demand for it.

Readers who want more information on the new products and who are interested on upgrading their micros are asked to contact Steve Davis of Dragon Data on 0656-744700.

Club doubt as Dragon Dungeon goes under

AFTER months of speculation, news has been released of the demise of Dragon Dungeon.

The company, which produced software for the Dragon and ran a club magazine entitled *Dragon's Teeth*, has gone into liquidation and is unable to fulfill outstanding customer orders. Details of customer creditors are in the hands of the accountants dealing with the winding-up of the company and readers with inquiries about outstanding orders should contact Marsh & Moss, 58 Baxter Gate, Loughborough, Leicester.

Attempts are being made to continue publication of *Dragon's Teeth* via a third party and if this attempt is successful, club members' subscriptions will be honoured by the new publishers.


OASIS SOFTWARE
present . . . TWO NEW RELEASES
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SPRINT BASIC COMPILER
A rapid step forward in Home Programming.
The newly released 1.1 upgraded compiler written by Dr. David Gray for Dragon 32 and 64 owners. By converting your own BASIC programs into intermediate code, Sprint accelerates them by up to 5 or even 10 times their normal running speed. Supporting virtually all the integer BASIC and cassette and printer commands. Sprint programs are not only compiled from tape but also run independently of the compiler.
SPRINT
Basic Compiler
For the DRAGON 32
DRAGON CHESS
Six levels of play.
All legal chess moves including en-passant, castling and pawn to queen promotion.
List of previous moves stored which can be displayed or printed.
Loading and saving of games positions from tape.
High resolution graphics which can be flipped round to make black or white play from either end.
Simultaneous text and graphics.
Sides can be exchanged at any stage.
Best move hint.
Set up from any position.
Opening move library.
Moves may be taken back and play resumed from any point.
"...I thought this was an excellent version of the game. Well worth buying." (Home Computer Weekly)
Change level of play at any point in the game.
Will adjudicate games between humans.
Very high standard of play.
Professional packaging and life-time guarantee.
"Dragonchess is without doubt the best value chess on the market today." (Microdeal)
DRAGONCHESS
BACKGAMMON - DRAGON 32
REVERSI - DRAGON 32
INVADER CUBE - DRAGON 32
DOMINOES - DRAGON 32
BACKGAMMON
The well known game of backgammon complete with full instructions and computer demonstration for beginners.
REVERSI
At last! Reversi running on your Dragon 32 or 64. 2 levels of play, full instructions and computer demonstration for beginners.
INVADER CUBE
As well as being one of the best games of skill written for the Dragon 32 and 64 it also has some of the best pure machine code graphics we have ever seen.
DOMINOES
Two games in one with full instructions. Hours of frustrating fun this program has 6 levels of play and on the higher levels adapts it's play to it's assessment of your ability.
MIND GAMES COMPENDIUM.
All five games for just £19.95
Oasis Products are available from: Boots and all good software suppliers. Including: Websters, Games & Computers, Microdeal, The Dragon Dungeon, PCS Distribution, Planmist, Gool Computers (France), Falck Computers (Scandinavia) and Joylab (Germany).
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Please send me: Dragon 32 / Dragon 64
DRAGON CHESS £9.95
BACKGAMMON £5.95
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DOMINOES £5.95
INVADER CUBE £5.95
MIND GAMES COMPENDIUM £19.95
I enclose cheque/PO for £
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ADDRESS

Masterful Microdeal

ZIP, ZAP, pow, bang, Microdeal has launched a new range of software for the Dragon. Billed as the "largest range of Dragon software released at one time", the new titles include arcade, strategy and adventure games.

Beam Rider is a high-speed arcade type game which has you jumping blocks and avoiding your pursuers, while Crash has you exercising evasive action in a continuation of the King.

The nasties are after Cuthbert again as he collects fuel and loot (Cuthbert in Space) and illuminates the landing pad (Cuthbert goes walkabout). In Galagon and King Tut you are presented with a sequence of five screens in order to test your reflexes and strategy (Galagon) and to journey through King Tutankamun's tomb collecting treasures (King Tut).

"A graphics adventure crossed with an arcade game" is how Alan Hobbs, Microdeal's Sales manager described The Touchstone, a complex adventure through different chambers in search of the sacred stone.

Chilly-willy manoeuvres his ice blocks across the Arctic wastes squashing all interlopers in Pengon, whilst back in the sun, Mr Dig reaps in a bumper crop of cherries, apples and other assorted fruits in the game of the same name.

Continuing the range of Dragon games are Electron, Grabber and Dungeon Raid, all of which we hope to review in subsequent issues.



John Symes displaying the "software key"

John Symes, Managing Director of Microdeal said that he is still heavily committed to the Dragon though Microdeal *are* branching out and expanding to other micros. John has taken Microdeal from "virtually nothing — in the back room of his house — to luxury offices" as the company moved up the ladder.

Combined with Microdeal's new releases are the new Tom Mix Label which Microdeal is distributing. Under this label there is Cu★ber, Katerpillar Two and Buzzard Bait, the latter game being "undoubtedly the best game out of this range for the Dragon" according to John Symes. And as if to prove it, Microdeal is launching its software key with Buzzard Bait, containing "secret, undecodable signals" to prevent piracy.

The key is plugged in to the joystick port where it generates a combination of signals specific to each title in order to load the game. Whether or not sales drop as a result of the key is a matter of conjecture, though Microdeal are obviously hoping that a fall in sales will be matched by a corresponding fall in piracy and a rise in revenue.

Finally, Microdeal are also marketing two serious software cassettes — Programmers' Utilities and Machine Language Tutorial.

Microdeal's cassettes cost £8 except Buzzard Bait and Machine Language Tutorial which cost £9.95, and should be available now in retail shops around the country.

Machine language aid for your micro

A MACHINE language monitor-disassembler with line editor and trace facilities has been released by Microtanic Software for the Dragon.

The Ace Trace, as it is known, costs £14.95 and combines the tools needed to debug machine code programs. It is written in position independent code and can reside anywhere in the Dragon's memory map from $0600 to $7FFF. It enables you to trace both Ram and Rom and comes with a standard 6809 Assembler supporting all Motorola mnemonics.

The advantage of the trace is that programs are executed on the screen nearly 500 times slower than when the program is run in real time, allowing you to spot something going wrong; and the reason for any faults is displayed on the screen. To speed things up the register dump can be suppressed and recovered at any time by pressing the R key.

Microtanic is discussing with distributors the possibilities of marketing the trace and further inquiries should be directed to the company at 16 Upland Road, Dulwich, London SE22.

Educated software

SHIVA is moving into the educational arena with the release of two programs which are part of a series of 11 titles planned for the Dragon.

The first two packs are called Lift off with numbers and Launching logic and both contain five games and an accompanying manual.

The Number games include Washing (hanging out shirts in the correct place to match colour and pattern), Cakes (lighting candles according to the number of dots on the die), Rockets (matching sixes), Bingo (making a line to beat your opponent) and Ladybirds (making the spots count up to 10).

For the logic games there is Logic Block, Pick a block, Ernie the engine (which involves rebuilding the engine), Sid the snake (using the coloured shapes to make a pattern) and On the right road (sorting shapes for colour, size or thickness).

The programs have been developed by Iris Hewett, senior maths adviser at Ashford Maths Centre in Kent, and are for children of 5 to 8 years old. Other programs in the series will be released in batches of two throughout the year, and all cassettes cost £9.95 including VAT.



COMPETITION is on the way for Cumana following the news that Microvitec is to launch a high-specification 5¼ inch floppy disk drive.

Both single and dual drive versions for use with the Dragon 32 and 64 computers will be available at the end of July. The disk drive uses the Delta disk operating system from Premier Microsystems and will therefore be in direct competition with Cumana's drive operating under the same system.

The single drive unit has an unformatted capacity of 500 KBytes (360 KBytes formatted) and the dual drive's capacity storage is 1 megabyte (720 Kbyte formatted).

The units are presented in metal cabinets, have built-in power supply, 40 data tracks per side and 48 tracks per inch. The single drive is expected to cost £325 and the dual drive will retail at £525. For further information contact Microvitec, Futures Way, Bolling Road, Bradford, West Yorkshire BD4 7TU.

Pains and pleasures

John Scriven swoops in on the latest software

THE COLLECTION of software I looked at last month seemed to show an upturn in quality. Unfortunately, this month's selection has not been as much fun to review, although there has been the occasional breath of fresh air.

Sometimes I wonder who thinks up the names of computer games. My favourite silly name this month is **Nerble Force** from Dragon Data. "You are one of the last human survivors on the planet Nerble" begins the blurb. Your task is to prevent the Nerble Force from kidnapping the few humans on the planet's surface and rescuing any that are left stranded. As play begins, you realise that this is simply another game of Defender in a different guise.

Fresh waves of aliens swoop in from left and right, giving you little warning other than a few blips on the radar display at the bottom of the screen. You control your craft's horizontal and vertical movement with a joystick, and use the fire button to zap the Nerbles. If you are lucky you can offer timely assistance to your fellow humans, but this is by no means an easy task. Using joysticks means that there are no smart bombs however, and all collisions seem to wipe everything out on the screen.

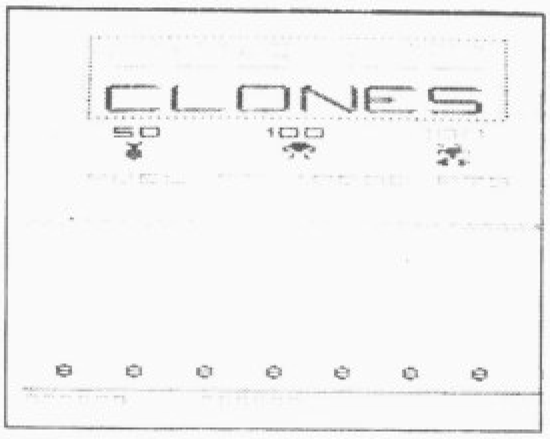
Limitations

If you don't have a copy of Defender you may enjoy this game, but there are better versions on the market. One point in its favour is its price, as this game is only £7.95. Several other Dragon Data titles are more expensive, such as Junior's Revenge at £10.95, but at least that follows the complexities of the arcade version. Nerble Force is a rather basic copy of Defender, and a higher price could not have been justified.

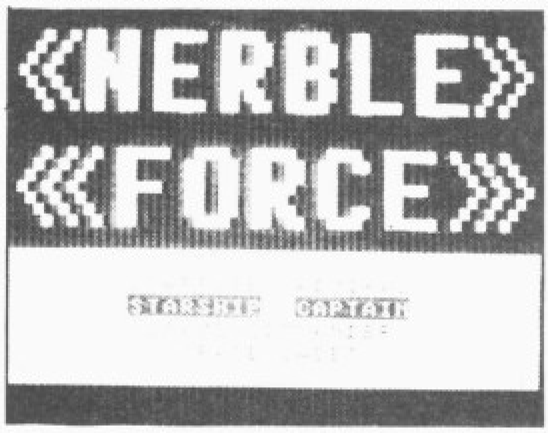
Cosmic Clones, also from Dragon Data, appears at the outset to be dangerously close to Invaders, but I'm pleased to say that it's much more imaginative. After a musical introduction (a rather incongruous rendering of "Pop Goes the Weasel"), you can choose to use a joystick or the keyboard. If you are right-handed, the up-arrow and Q key are used, and the cursor keys are available for left-handed users.

You can move your base across the screen, as various aliens descend from above. According to the instructions, they are called "Clonials". These change into Double Bombs if they are shot once, but increase in size if they touch the ground. They can be shot by pressing the space bar before they have a chance to land. The documentation informs you that they change not into Clone Rangers or Wild Colonial Boys, as you might imagine, but simply "Superklones". The order of change is Superklone into two Clonial Warriors, and Clonial Warrior into two Double Bombs, so several direct hits are necessary to destroy them completely. All the while, a line across the screen shedding lethal particles gets lower and lower until there's no room left to manoeuvre

I wasn't very happy about the warbling that poured in a constant stream from the TV, but the game itself is not bad, and certainly worth looking at.



Cosmic Clones: more imaginative than Invaders



Nerble Force: Defender in a different guise

A recent name in the ranks of software houses is Galactic Software, the publishers of several programs including **Froggy** and **Bug Diver.** Froggy is, as one would expect, the game of Frogger, which has already appeared in several versions over the last year or so. As is usual, you have to steer a little frog across a road, on to logs in a river and finally bounce on lily pads to safety on the far side. This version is reasonably fast, and the smiling frog faces as they reach the other side of the river are quite good, but the game uses the keyboard for control and this makes it very frustrating to play. It is possible to write games that respond to instant key presses, but the way the Dragon operates means that it can be away doing something else just at the moment when you press a key. Games that use key presses for control need to take this into consideration or else use a different method for scanning the keyboard. Some word-processors for the Dragon are like this, and you lose letters if you type too quickly, but it's very irritating when it occurs in a fast game.

Bug Diver suffers from the same problem, and unless you fully release a key before pressing another, the Dragon won't respond to the new key. The game is a rather simple affair of steering a beetle down a screen of fast-swimming fish to steal their eggs from the ocean floor. You then have to rise to the surface with them, where they can be safely deposited in a waiting speed-boat. The game is fairly novel in concept and you need to be quite skilful to succeed, but it's not as refined as recent programs from the larger software companies.

Topical

Talking of large companies, or at least those with impressive catalogues, it's been a couple of months since I've seen anything from Microdeal for the Dragon. They have recently increased the number of machines they supply, and the large quantity of new Dragon software from the States seems to be drying up, although they still have a range of nearly one hundred titles. They must have realised that I was pining away for Cuthbert, as a tape of his new and highly topical escapades arrived this month.

Starting with a burst of "Clementine" from the TV, **Cuthbert in the Mines** shows poor Cuthbert at his lowest ebb. Along with some friends, he has been captured by the Moronians, and they have been forced (by the NCB?) to work in the mines, from which they constantly attempt to escape. The screen display shows the different levels running underground, with trucks passing along rails. Using a joystick, you control little figures that can run right or left and also jump from one level to the next. Adding to their confusion is a demon (called MacGregor?), who climbs a ladder on the right-hand side of the screen. Every so often, he releases a fireball which must be avoided at all costs. If this catches the figure, it descends rather rapidly to the eternal flames that lie at the base of the display.

The graphics are good, and the responses to the joystick very smooth. Although I still prefer Cuthbert in the Jungle, this is an entertaining game and well worth £8. The only thing missing in this game is a cluster of picketing miners, but I don't suppose they have the benefit of unions in Moronia.

A firm that is better known for its BBC software is A&F Software. Like Microdeal, they have apparently decided to diversify, and have included the Dragon in their list of micros. **Chuckie Egg** has an unusual setting — a farmyard. The object of the game is to obtain as many eggs as you ▶

◀ can while avoiding strange creatures that seem to inhabit the farm. The display consists of several levels connected by ladders. The eggs, along with small piles of corn are lying on the ground. As you make your way around the farmyard, you can pick up the eggs and gain points. There are some rather mean-looking ducklings wandering about the screen just waiting to pounce on you, as well as a malevolent duck in a cage at the corner of the display. According to the program notes this is capable of producing mayhem in the peaceful farmyard, but it has yet to do anything unpleasant to me!

Favourite

Up to four people can play at the same time, and the scores are clearly shown on the display, as is a clock, quietly ticking away. When you have collected all the eggs on one screen, the display scrolls smoothly upwards, and you are faced with yet another section of the farmyard with slightly more complex surroundings. The game is very well written, and the difficulty levels are nicely gauged to allow steady progress through the different stages. There is a list of the top eight scores at the end, as well as the opportunity to redefine the control keys. If A&F Software can produce more programs like this for the Dragon, it will be no bad thing. This has to be my favourite program this month.

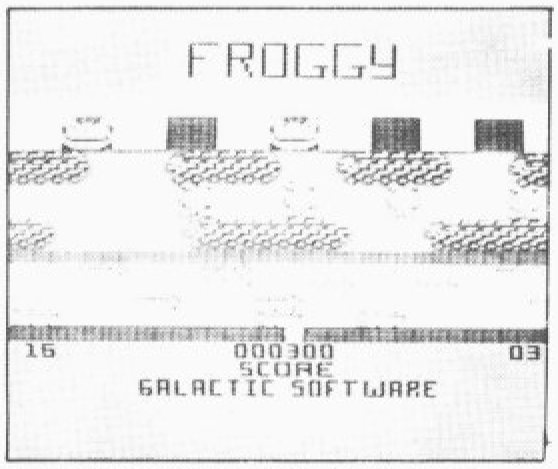
One program with a lot of potential is called **If I Had A Million** from Phoenix Software. As might be guessed, this is a version of Monopoly, but with an original twist. There are two cassettes inside the packaging: one, called the Action game, consists of the usual property trading game. All the well-known London properties are there, including Old Kent Road and Park Lane (but not, I noticed, Little Newport Street!). If you are lucky enough to win a game, as well as amassing at least £20,000, you are given a code word that has to be remembered. The usefulness of this is not obvious until you try to play the second cassette, the Adventure, and discover that you need the code to get started.

This game consists of six months during which time you have to convert a borrowed million into five million. You can invest in stocks and shares, buy old houses and rent them out at extortionate rates or invest in West End musicals.

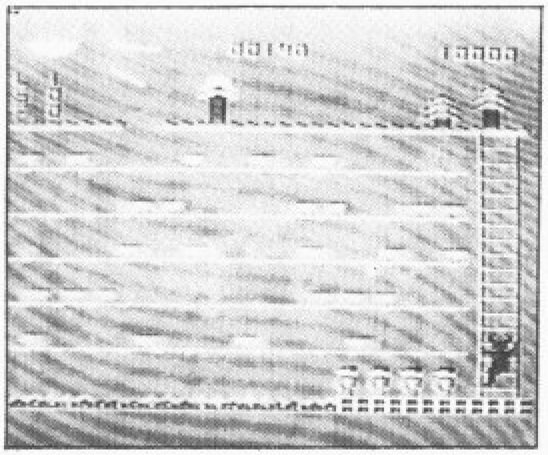
I found the first cassette rather dated — you can never see the whole board at one time, and there is no facility to play against the computer. This is only used to throw the dice and display the positions. At the end I had just been given the codeword when the program crashed, which was a little disconcerting. Both programs flash instructions up too quickly, and it's easy to miss important messages. As people read at different speeds, there should be something like, "Press the space bar when ready"

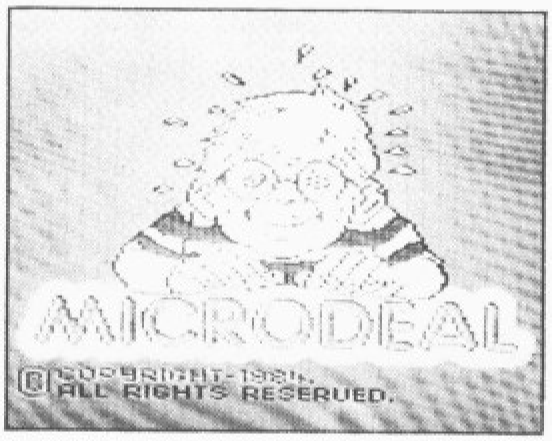
The second program had a more original setting, and is actually in two halves. At the end of the first section, the new code word was flashed on the screen so quickly that it was impossible to read, and I had to stop the program and go through the listing to see what I had missed. It's a shame that the programs are marred by these little faults, as they could have helped present an old game in a new format.

When you buy a computer, there are bound to be things about it that you find disappointing — no lower case, no printer port, no disk interface, no monitor connections, and so on. The Dragon, although it has many fine features, is deficient in some respects, and this is where other manufacturers can help out with a range of utilities that aren't there in the original machine. Two such programs have come my way this month.



Reach the safety of the lily pads in Froggy


Cuthbert at work in Cuthbert in the Mines



Good graphics from Microdeal

The **Animator** from Screenplay is a graphics package designed to give you access to sprites or large user-defined characters, similar to those available on the Commodore 64 and Atari machines. The program is menu-driven and gives you the option of defining up to 24 different sprites, reflecting or translating them and storing their definitions on tape. The defining is achieved on a large grid, and the new sprites can be used in your own programs. Controlling the sprites is rather tedious, as you need to PEEK and POKE the memory locations where the routines are stored. Although this may appear time-consuming, it is the method used on the Commodore 64.

The effects that can be achieved can be spectacular, but it's a pity that a look-up table of new words could not have been written into the software to make the programmers job a little simpler. There are demonstration programs included, and the Animator is well-documented. If you are prepared for a little effort, this package could prove useful, and the price of £9.95 is a lot less than some cartridge versions.

Rainbow writer from Microdeal is another attempt to get over the Dragon's limitations in the area of graphics, and is termed a "screen enhancer" This program used extra print statements to hold control codes for up to 224 new characters. There are more than enough of these for most purposes, including lower case letters, tanks, aliens and Greek symbols, but should they prove insufficient there is an option to define your own. Display modes can be altered, and it's possible to have up to 64 characters in one line, which is useful for word processing, or to go the other way and have only 16, which is useful for games. The documentation is clear, although there are helpful messages on the screen itself. One of the best features is that you can include all the results of the program in your own software (and even market it commercially provided you inform Microdeal).

Languages

Just as there are many human languages, so there are several ways of communicating with computers. At the simplest level, computers understand machine code — a series of binary numbers that stand for both instructions and data. To make this more meaningful, there is assembly language that makes slightly more sense. These are low level languages; they are called high level if they get closer to human natural language. Basic is a high level language, because the command set is close to English (for example, you can simply say PRINT "something" and "something" appears on the screen).

One problem with a language like Basic is that it is interpreted into machine code instructions when you type RUN, and this slows down the speed. This isn't important in many applications, but it can be irritating when you are trying to write high-speed arcade games. There are several options open to Dragon users who want to overcome this problem:

1) buy a good assembler package and learn to program the 6809E directly;
2) compile your BASIC programs, or
3) use a different language to BASIC.

I have reviewed several good assemblers in the past, but in this article I'm going to look at the second and third ways of speeding things up.

As I stated before, most microcomputers ▶

EDIT+
– A true Utility
*
Some "utilities" are really not very useful when you come down to it. To be genuinely useful the software has to do something quite special – it has to be a real improvement over the way that you do things now and be convenient to use.
We looked at the DRAGON. The facilities for program development are primitive and the display is a joke. It could even put you off programming for life.
EDIT+ is a real improvement for the DRAGON. It allows you to develop programs quickly and easily, whatever they are for.
In addition EDIT+ includes HI-RES, an enhanced screen display with 24 lines by 51 characters, selectable character sets (English, French, German, Danish, Swedish, Italian, Spanish), Sprite graphics, redefinable characters, and an improved keyboard action with auto-repeat. Graphics and text can be mixed on the same screen.
To use EDIT+ you either plug in the cartridge or load the program from disk. Tapes are fine for games – not for something you will use over and over again.
Programming can be pleasant – try EDIT+ and see how. It may even help you to make proper use of some of the other "utilities" on the market.

EDIT+ (Incl. HI-RES) Cartridge	£34.50*
EDIT+ (Incl. HI-RES) DRAGONDOS Disk	£24.00*
HI-RES Cartridge	£25.30

EDIT+/HI-RES are available for TANDY COLOR 32k

DASM/DEMON
– The Authors Choice
*
When we wrote the DEMON monitor and the DASM assembler for the DRAGON we were confident that they were going to be popular, because they were good programs aimed at a discerning and appreciative audience.
We were delighted to see DASM/DEMON become the most regularly featured assembler in independent DRAGON machine code articles.
We were rather proud when Ian Sinclair chose our assembler and monitor for his book "Introducing Dragon Machine Code" and thrilled by his description of DASM as "The Rolls Royce of Assemblers".
Our latest accolade is in "DRAGON Machine Code" by Robin Jones and Eric Cowsill who use DASM for the worked examples throughout their book.
These gentlemen know their stuff and they picked our product. Perhaps you should too.

DASM/DEMON*	–Dragon Cartridge	£30.45
	–DRAGONDOS disk	£19.95
DASM	–Dragon Cartridge	£18.95
DEMON	–Dragon Cartridge	£18.95

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–Power to the People

If you own a DRAGON64 and a disk unit then you have already made a serious commitment to this computer and want the best possible performance from it.
Preferably without having to learn a lot of irrelevant "computerese".
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FLEX has the virtue, for ordinary mortals, of being easy to use and understand. That is a result of design, not accident. There are few things about FLEX that you cannot understand in a session or two of using the software.
For example if you want to copy all the files from disk drive 1 to disk drive 2 you type COPY 1,2. Nice and easy, no Ph.D. required. Try that with your current disk operating system and you will begin to understand why we prefer FLEX.
FLEX gives you more free space for use, 48k to be exact. FLEX allows the use of single or double sided, single or double density disks of whatever number of tracks. In other words any kind of 5" disk or disk unit. We don't want to cramp your style and if you buy software from another source for FLEX you will be able to read the disk. Try that with your current disk operating system.
We will be issuing a FLEX utility disk which will allow you to run DRAGON BASIC with FLEX. So you don't have to start again with a new BASIC. If you want PASCAL, COBOL, FORTRAN, FORTH or "C" they are available from several sources. An editor and assembler are part of the standard FLEX package.
In short, good software, reliable and easy to use – that is FLEX.

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Editor + Assembler **£45** plus VAT
Flex including Editor and Assembler **£75** plus VAT

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BOOKS

Books and Extras

Dragon Machine Code by Jones & Cowsill	£6.95
Introducing Dragon Machine Code by Ian Sinclair	£7.95
Advanced Sound and Graphics	£5.95
The Working Dragon 32	£5.95
Programming the 6809 Zaks	£12.50
6809 Assembly Language Prog. Leventhal	£12.85

Postage on books: 50p per book except Zaks/Leventhal £1.30 maximum £1.50.

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◀ use interpreted Basic, with translation into machine code taking place at run-time. A compiler is a little like a turbo-charged sausage machine. After writing your Basic program, you feed it into the compiler and it comes out converted into machine code. Once it has been compiled, it cannot be edited or altered, so two versions need to be kept in case of changes at a later stage.

There are several problems that occur when using compilers. First, they take up memory space in the host computer, so full-length programs cannot be compiled, and secondly, they usually cannot compile a complete set of the Basic language: they frequently have problems with decimals and string variables. If you can live with these small deficiencies, most programs show a substantial increase in speed, and could prove easier than learning machine code.

Compiler

Oasis Software from Weston-super-Mare produces a compiler for the Dragon called **Sprint.** Arriving in a smart case decorated with Porsches, it is a well-documented program that compiles most Dragon programs. It has a few drawbacks, but these are mainly surmountable. Although it will only accept integers, you can use fractions to represent decimals. For example CIRCLE commands can use 0.5 by entering 32 (64). The X parameter in DRAW and PLAY commands will not work either, but there are notes in the documentation to explain how to get round this.

The documentation itself is very full, and consists of 48 pages of closely set text. Although it seems fairly complicated, the procedures are clearly explained, and there are sample programs to try out. After the initial compilation into an intermediate code, a list of errors appears on the screen, or can be directed to a printer. When these have been corrected, the final compilation takes place and the finished program can either be executed or saved to cassette. The package includes two cassettes, one containing the compiler, and the other a demonstration program in both Basic and compiled versions. There is a graphic version of 3D noughts and crosses with little aliens as the pieces and it demonstrates well the usefulness of the program.

Learning another language to increase speed might seem rather an intimidating task. In fact, just as you can use a small sub-set of Basic words and gradually build up your knowledge, so you can learn other languages at your own pace. Microdeal sells a version of Forth for the Dragon called **Teleforth** which comes in a bulky A4 folder like its Telewriter word-processing package.

When you come to learn Forth, it's probably a good idea to empty your mind of previous programming ideas. Whereas a Basic program can be seen as a logical flow of operations with control passing from one line to the next, like a list of things to do on a shopping expedition, Forth is based on defined words that are made up of primitives — words that link directly to machine code routines. When you begin to use Forth, these words are used as building blocks to form new words which are used in turn to define others and so on.

Eventually you end up with one word that defined the program, like the top stone in a pyramid, resting on all the others. In fact, the interconnections between words are usually more complicated than that, and because the action threads its way through the words, Forth is described as a "threaded interpreted" language.

Nerble Force **Cosmic Clones** £7.85 each	Dragon Data Kenfig Estate Margam Port Talbot
Froggy **Bug Diver** £5.50 each	Galactic Software Unit 7 Larch Field Estate Dowlish Ford Ilminster Somerset
Cuthbert in the Mines £8.00 **Rainbow Writer** **Teleforth** £19.95 each	Microdeal 41 Truro Road St Austell Cornwall
Chuckie Egg £7.90	A&F Software Unit 8 Canalside Estate Rochdale
If I had a million £9.99	Phoenix Software Spangles House 116 Marsh Road Pinner Middlesex
The Animator £9.95	Screenplay 134 St Vincent St Glasgow G2 5JU
Sprint Compiler **Petite Pascal** £14.95 each	Oasis Software 9a Alexandra Pde. Weston-Super-Mare Avon

There are two main versions of Forth, Forth 79 and figForth (from Forth Interest Group). The Microdeal version is closer to figForth, although it has been adapted to take advantage of the particular features of the Dragon. It's a pity that there isn't a demonstration tape of how these features are used in new Forth words or how they put fast screen movement into your definitions.

The manual that comes with Teleforth is about 60 pages long and gives a complete list of figForth words together with all the new words that are specific to this version. Apart from that, it simply tells you how to define words, save and load programs, and gives an introduction to arithmetic in Forth. As it stands, it's more of a technical manual rather than an instruction guide, which means you will need to buy a separate Forth tutor. This does not create too many problems, however, as there are several Teach-yourself Forth books on the market, and the machine differences are by no means as large as those in, say, Basic. A more serious criticism is that of the choice of colour of the paper in the manual. This is yucky brown, and the text is in black, which does not aid legibility.

All versions of Forth will give you a large increase in speed and Teleforth is no exception. The error messages are brief but clear, and Forth certainly helps you think clearly, which will improve your programming skills in general. It seems that Forth is destined never to take off in a big way, but this shouldn't put you off adding this package to your collection.

The other alternative language to Basic available for the Dragon is Pascal. Although not in itself any faster than Basic, it is a compiled rather than an interpreted language, and so it tends to run faster at execution time. The producer of the Sprint Compiler, Oasis Software, also produce a version of Pascal called **Petite Pascal.** It has to be a rather small set of the complete version, as it has to reside in memory along with any programs that use it, but anyone becoming proficient at using this would have no trouble in transferring to a full version of Pascal on a larger computer.

Some of the commands in Pascal are similar to those in Basic, and several recent versions of the latter, such as that for the BBC machine, have borrowed a lot of the structures. It's only fair to point out however, that many people find Pascal fairly difficult after Basic. Once you succeed in writing the initial program, it is compiled by entering RUNO. Errors are detected in much the same way as in the Sprint program, and are not always easy to correct.

Error tracking

I've always found error tracking in Pascal a tedious business, but Petite Pascal is no worse than many others in this respect. The need to define variables and so on at the start of the program is probably a good idea, and forces you to construct elegant programs. Unless you know exactly what your intentions are right at the start, the program is unlikely to ever function properly. The compiler produces an intermediate code called P-code, which is entered on a stack and interpreted at the time of execution.

The documentation is contained in a 40-page mini-booklet and is very clear in what can be a complex subject. As well as copious information, it contains many example programs and there is also a demonstration cassette. You would be well advised to buy a supplementary tutor to back up these aids, however, as Pascal needs a far more structured approach than Basic. If you are interested in learning Pascal, this package is an economical way of achieving your aim, and can certainly be recommended.

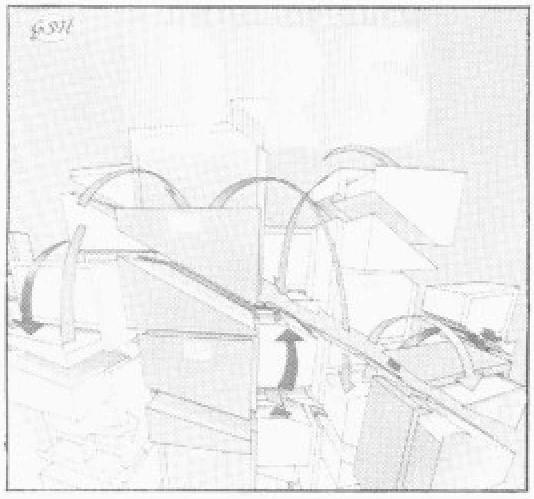
The serious software this month has in general been of a much better standard than the games programs. I hope that this will encourage programmers to improve the quality of the entertainment side of the industry. Next month there should be some sequels to old favourites, and that will provide some titles worth waiting for. ■

Specialised databases

***Keith and Steven Brain** examine more business system software and applications for the Dragon.*

IN THE MAY '84 issue of *Dragon User* we took a look at a number of "serious" applications programs for the Dragon, and in this issue we peer more closely into offerings for the small business world. However, as a couple of database programs arrived too late for our earlier review we will make brief comments about them first. (Photocopies of our previous article can be obtained by sending a large SAE to *Dragon User*.)

Salamander's **DRS** (Data Retrieval System) is available on cassette, but with full instructions on transferring the program to the Dragon DOS disk system. Cassette data files can each hold 22,000 characters and on disk up to seven segments of 22,000 characters (154,000) can be treated as a single file, but with each segment being processed in turn in RAM. Maximum record length is 480 characters with a maximum of 36 fields.



It is possible to "design" your own screen layout with a full-screen editor similar to that described previously in connection with Microdeal's Filmastr. (Q)uitting DRS does not affect the workspace so that system commands (such as DIR) can be made and then you can jump straight back into DRS with EXEC (provided that a checksum test reveals that you have not succeeded in corrupting your file meanwhile).

Eurosoft is offering tape and disk versions of Sugar Software's **TIMS** (Tape Information Management System). This is mainly written in Basic but with machine code routines built-in for sorting, and is a pretty standard database program.

One application of general database programs is the maintenance of address files and mailing lists, but specific programs dedicated solely to these functions are also available. These are more user-friendly than normal databases, but, as they are restricted to this single application, they are mainly of interest to users with limited objectives who do not have the confidence to set up their own system.

The cassette based **Mailing List** (Abacus) stores names, addresses and telephone numbers and also allows six user codes, which may be used to select groups of entries, to be included in the record, and alphabetical sort by name is provided.

Mailer/Address Book (MST) is available on cassette or disk. Only name, address and telephone number are recorded and enquiries can be made by name or address. If a match with the searchkey is not found then you can obtain a list of partial matches which may contain the record you seek. Records can be printed out and an area search option allows you to produce a print-out based on partial matching of records (for example, town or country).

Great expectations

Another popular type of specialised database is the stock management system which allows a trader to easily keep records to be made in good time and allowing more efficient use of the stock available. Offerings in this area range greatly in price and of course you must always remember that you tend to get what you pay for so your expectations should be in line with the cost, although you must also consider how tight your stock control needs to be.

We have certainly seen microcomputer stock control systems employed in small retail businesses where they had no hope of ever being cost-effective, as the time spent in entering all the transactions was much greater than that required to simply look for gaps on the shelves! Standard minimum features are creation of a stock file, addition of stock, reviewing stock levels and value, and producing re-order lists.

Of course a cassette based system is slow to load and inevitably rather limited, but, the Abacus cassette does provide the fundamental essentials in an inexpensive package which is probably worth experimenting with if your requirements are limited or you are not sure whether a stock control system can help you. The MST **CD Series Stock Control**, available on cassette or disk, has similar capabilities — but if you have a disk available then perhaps you should be looking further up-market. MST also has the **Stock Control System** in its "professional range" which also copes with stock taking and will produce a shrinkage report.

Finally, at the top end is Dragon Data's **Stock Recording System** running under OS9. Of course this does not look exactly cheap, although it must be remembered that the price does include a detailed 80-page manual which clearly explains the workings of the system with the aid of numerous screen layouts.



The system uses the 51-column screen so that there is much more room for text on screen, true upper and lower case are produced, and transactions can be dealt with in much more detail. For example, "issues" can be classified as Sales, Requisitions, Returns to Suppliers or Scrapped; and "stock reports" allow for Stock listing and valuation, Slow Moving Items, Re-order Lists and Usage History.

Records of purchases and sales are essential in any business, and once again the range of available packages is wide. Fundamental essentials are preparation and recording of invoices and credit notes, recording cash receipts, and preparation of reports such as statements, aged debt analysis, daybook and so on. Abacus offers an inexpensive cassette with a **Purchase Ledger** on one side and a **Sales Ledger** on the other, which will cope with 60 accounts and 200 transactions on the Dragon 32.

MST **CD Series Invoices/Statements** is essentially a formatting program which has rather more limited capabilities concerning preparation of "tidy" invoices, whilst its more expensive "professional range" **MST-Exec** combines the invoice/statement formatter with a mailing list program, where output can be spooled to disk for later printout to speed up processing time. However, these two MST ▶

◀ offerings do not keep transaction records so you must do the real hard work elsewhere.

Micro Business Centre has produced a Dragon version of its established Apple **Sales Ledger System** (part of an Integrated Business System), which is more likely to impress your accountant, but once again it is Dragon Data at the top of the pile with its **Sales Ledger** and **Purchase Ledger** (out soon) which also hails from Computer Support Services, and operates on the 51-column screen.

Keeping track

If you want to try to work out where the money is going then even more records may be needed to keep a track. Abacus kicks off at the bottom once again with the separate **Cashbook and VAT Accounts** program on a single cassette. The first deals with keeping records of sales and expenditure, whilst the second produces your quarterly VAT return in the form "preferred by the VAT Office" (isn't that dripping with blood?), and includes a testfile for practice.

For the smaller business which is exempt from VAT, Abacus provides **Non-VAT Accounts** which provide quite a comprehensive package of records and facilities, up to and including production of trial balances and a profit and loss account taking into account depreciation.

MST's **Business Accounts** records sales, expenditure, and bank accounts and includes facilities for printing out lists of creditors and debtors.

Mailing List **Stock Control** **Cashbook and VAT Accounts** **Non-VAT Accounts** £15.00 each **Purchase/Sales Ledger** £29.95 **Payroll** £25.00	Abacus Software 21 Union Street Ramsbottom Nr Bury Lancs
Stock Recording System **Cash Book and VAT Register System** **Sales Ledger** **Purchase Ledger** £49.95 each	Dragon Data Kenfig Industrial Estate Margam Port Talbot West Glamorgan SA13 2PE
TIMS £19.95	Eurosoft 1 Punch Lane Limeslade Swansea West Glamorgan
Dragon Sales Ledger £99.00	Micro Business Centre 17/19 Lichfield Street Wolverhampton West Midlands
Mailer/Address Book **CD Series Stock Control** **Invoices/Statements** **Business Accounts** £24.95 each **MST-Exec** **Stock Control System** £59.95 each	MST Consultants Newton Road Bovey Tracey Devon TQ13 9BB
Data Retrieval System £14.95	Salamander Software 17 Norfolk Road Brighton BN1 3AA

Dragon Data's/Computer Support Services' **Cash Book and VAT Register System** will probably look very familiar to anyone who has worked into the small hours with their quill pen over their "Simplex" books! Having slaved away in such fashion ourselves we can appreciate the value of "familiarity" with the system and reckon that most small businessmen should have no problem adapting to this system.

Finally, Abacus provide a **Payroll** program which should be of interest to the business with a small number of staff, as it automatically carries out all those tedious income tax and National Insurance calculations and produces proper payslips for each employee. All the Tax and NI data is described in detail in the program so that the arrival of a new budget does not mean the end of the usefulness of this program.

Take the plunge

Our overall impressions were that a useful range of business programs are available for the Dragon. For those unsure whether they should dip their tender feet into the shark-infested waters of computerised accounts for the first time, the series of Abacus offerings allow you to gain first-hand experience without breaking the bank.

On the other hand, if you are ready to take the plunge into deeper water, the integrated series of very professional and well-documented packages from Dragon Data have a lot to offer, provided that you are already running OS9. ■

Activating autorunning

Brian Cadge *shows you how to autorun Basic programs after loading*

OF ALL THE questions that I am asked for "Dragon Answers", the one that seems to come up more than any other is: "How can I get my Basic programs to autorun after loading?" The reason this has not been answered is that although it is possible to autorun programs, the solution simply wouldn't fit into the space allowed.

As demand is so great, we have decided to publish a full program that will allow Basic programs to be autorun after loading. The program is written in machine code and is shown in two listings. The first, the assembly language listing, shows how the program works (this is fully commented for any one that understands assembly language and wants to know how the program works)

Important

The second listing is the important one. This is the one you type in and save *before* running. If you have made any mistakes entering the data statements, the program warns you of this and will not run; otherwise the machine code is loaded into reserved RAM at the top of memory and the loader program is newed.

Once you obtain the "Load Successful" message, you can load in your Basic program that is to be autorun. When you are ready to save it, do not use CSAVE "filename" as you would normally, but instead use: A = USRO ("filename"). The Basic program will be saved together with an autorun routine. (The filename given in the USRO statement *must* be between quotes, be no longer than eight characters, and cannot be a variable, such as A$.)

At a later date when you wish to load the Basic program back, type CLOADM (not CLOAD as usual). You will see the familiar loading signals, but once loaded the program will then automatically RUN itself.

This program should satisfy all those readers who have written in to *Dragon User* on the subject, including those who pointed out that disabling the LIST command is not very useful unless the program autoruns.■

```
10 ' AUTORUN MACHINE CODE LOADER
20 CLEAR200,32500
30 CLS:PRINT"LOADING MACHINE CODE"
40 FORI=0 TO 219:READ A$
50 CS=CS+VAL("&H"+A$)
60 POKE 32501+I,VAL("&H"+A$)
70 NEXTI
80 IF CS<>22298 THEN PRINT"ERROR IN
   DATA":SOUND1,1:STOP
90 DEF USR0=32501
100 CLS:PRINT"LOAD SUCCESSFUL"
110 NEW
120 DATA 9D,A5,81,28,27,08,9E,A6
130 DATA 30,1F,9F,A6,20,F2,9D,9F
140 DATA 81,22,26,12,8E,01,D2,9D
150 DATA 9F,81,22,27,0E,A7,80,8C
160 DATA 01,DA,24,07,20,F1,C6,08
170 DATA 7E,83,44,86,20,8C,01,DA
180 DATA 24,04,A7,80,20,F5,86,08
190 DATA B7,01,D1,8E,7F,84,10,8E
200 DATA 03,02,A6,80,A7,A0,8C,7F
210 DATA D0,23,F7,B6,01,67,B7,01
220 DATA 15,86,7E,B7,01,67,BE,01
230 DATA 68,BF,01,16,8E,03,02,BF
240 DATA 01,68,8D,12,BE,01,16,BF
250 DATA 01,68,B6,01,15,B7,01,67
260 DATA BD,B6,A5,7E,83,71,8E,01
270 DATA 00,BF,01,E7,34,10,8E,03
280 DATA FF,34,10,8E,03,02,BF,01
290 DATA E5,34,10,7E,99,1B,39,12
300 DATA B6,01,15,B7,01,67,BE,01
310 DATA 16,BF,01,68,AD,9F,A0,04
320 DATA 8E,01,DA,9F,7E,AD,9F,A0
330 DATA 06,26,2B,9E,19,9F,7E,34
340 DATA 10,AD,9F,A0,06,26,1F,35
350 DATA 10,96,7C,4C,27,06,30,89
360 DATA 00,FF,20,E9,9E,7E,30,1F
370 DATA 9F,1B,BD,BD,DC,BD,84,1F
380 DATA BD,83,ED,7E,84,9F,C6,2A
390 DATA 7E,83,44,12
```

The assembly language listing (below) and the machine code loader (above)

```
4E21                 *
4E21                 * DRAGON USER BASIC AUTORUN
4E21                 *
7EF5  7EF5                   ORG    32501
7EF5 9DA5            GETNAM  JSR    165       NEXT CHR
7EF7 8128                    CMPA   #'(       FIND START
7EF9 2708                    BEQ    NAME      OF USR
7EFB 9EA6                    LDX    166       ARGUEMENT
7EFD 301F                    LEAX   -1,X
7EFF 9FA6                    STX    166
7F01 20F2                    BRA    GETNAM
7F03 9D9F            NAME    JSR    159       NEXT CHR
7F05 8122                    CMPA   #'"       IS IT " ?
7F07 2612                    BNE    ERROR1    NO = ERROR
7F09 8E01D2                  LDX    #466      FILENAME
7F0C 9D9F            NEXCHR  JSR    159       NEXT CHR
```

```
7F0E 8122              CMPA  #'"       END NAME?
7F10 270E              BEQ   GOTNAM
7F12 A780              STA   ,X+       STORE IT
7F14 8C01DA            CMPX  #474      AT END OF
7F17 2407              BHS   GOTNAM    LEGAL NAME
7F19 20F1              BRA   NEXCHR    LOOP AGAIN
7F1B C608      ERROR1  LDB   #8        FC ERROR
7F1D 7E8344            JMP   33604     GOTO ROM
7F20 8620      GOTNAM  LDA   #32
7F22 8C01DA            CMPX  #474      PAD NAME
7F25 2404              BHS   FINPAD    WITH SPACE
7F27 A780              STA   ,X+
7F29 20F5              BRA   GOTNAM
7F2B 8608      FINPAD  LDA   #8
7F2D B701D1            STA   465
7F30           *
7F30 8E7F84            LDX   #AUTRUN   COPY THE
7F33 108E0302          LDY   #770      BOOT UP
7F37 A680      COPY    LDA   ,X+       PROGRAM TO
7F39 A7A0              STA   ,Y+       SPARE RAM
7F3B 8C7FD0            CMPX  #ENDCOP
7F3E 23F7              BLS   COPY
7F40 B60167            LDA   359       CAUSE THE
7F43 B70115            STA   277       PROGRAM TO
7F46 867E              LDA   #126      AUTOBOOT
7F48 B70167            STA   359       USING THE
7F4B BE0168            LDX   360       PRINT
7F4E BF0116            STX   278       VECTOR
7F51 8E0302            LDX   #770
7F54 BF0168            STX   360
7F57 8D12              BSR   SAVHED    SAVE M/C
7F59 BE0116            LDX   278       RESTORE
7F5C BF0168            STX   360       PRINT VECT
7F5F B60115            LDA   277
7F62 B70167            STA   359
7F65 BDB6A5            JSR   46757     SAVE BASIC
7F68 7E8371            JMP   33649     GOTO BASIC
7F6B 8E0100    SAVHED  LDX   #256      START M/C
7F6E BF01E7            STX   487
7F71 3410              PSHS  X
7F73 8E03FF            LDX   #1023     END M/C
7F76 3410              PSHS  X
7F78 8E0302            LDX   #770      ENTRY M/C
7F7B BF01E5            STX   485
7F7E 3410              PSHS  X
7F80 7E991B            JMP   39195     SAVE CODE
7F83 39                RTS
7F84           *
7F84 12        AUTRUN  NOP
7F85 B60115            LDA   277       RESTORE
7F88 B70167            STA   359       THE PRINT
7F8B BE0116            LDX   278       VECTOR
7F8E BF0168            STX   360
7F91 AD9FA004          JSR   ($A004)   READY IN
7F95 8E01DA            LDX   #474      BUFFER ADR
7F98 9F7E              STX   126
7F9A AD9FA006          JSR   ($A006)   BLOCK IN
7F9E 262B              BNE   ERROR2    I/O ERR ?
7FA0 9E19              LDX   25        START BAS
7FA2 9F7E      LOAD    STX   126
7FA4 3410              PSHS  X
7FA6 AD9FA006          JSR   ($A006)   NEXT BLOCK
7FAA 261F              BNE   ERROR2    I/O ERR ?
7FAC 3510              PULS  X
7FAE 967C              LDA   124       CHECK EOF
7FB0 4C                INCA
7FB1 2706              BEQ   EOF
7FB3 308900FF          LEAX  255,X
7FB7 20E9              BRA   LOAD
7FB9 9E7E      EOF     LDX   126
7FBB 301F              LEAX  -1,X
7FBD 9F1B              STX   27        END OF BAS
7FBF BDBDDC            JSR   48604     MOTOR OFF
7FC2 BD841F            JSR   33823     BASIC VECT
7FC5 BD83ED            JSR   33773     BASIC VECT
7FC8 7E849F            JMP   33951     RUN IT
7FCB C62A      ERROR2  LDB   #42       I/O ERROR
7FCD 7E8344            JMP   33604     GOTO ROM
7FD0 12        ENDCOP  NOP
7FD1
```

Versatile Dragon

Iolo ap Gwynn's *simple solution to enhance the quality of your creativity*

ONE OF THE few drawbacks of the Dragon, and one which puts many people off the machine at first sight, is its rather limited text screen with no lower case letters available and that horrible green background colour! Also limiting is its inability to mix text and graphics.

Although it is possible to define individual characters as needed in individual programs, this is a tedious business at the best of times, as you have to type in those long strings every time. To remedy these drawbacks, I have devised a simple solution.

The approach I have taken is to write a program which I load into the computer before I start writing every new program. This provides me with a complete ASCII character set which I can use freely on the graphics screen. All the characters are produced using the versatile DRAW command.

The DRAW command, as implemented on the Dragon 32, is particularly powerful because of the way in which sets of instructions for use in it can be held in strings. Because of this they can be easily predefined, and called when needed.

All of the ASCII characters were defined on a 5 × 9 matrix of dots and translated into a string of instructions for the DRAW command to be used at the 5 × 9 pixel level. This means that when used unenlarged by the scale function, single characters will only be clearly seen when PMODE4 is used.

At this level it is possible to have a 50-character line, with about 20 lines on the screen. It is easier to read the characters when they are drawn in black on a white (buff!) background. This is achieved by calling the SCREEN1,1 command, clearing to white using PCLS1 and setting COLORO,1.

It is also possible to enlarge the character size up to 16 times using the scaling instruction within the DRAW command. When larger characters than the minimum are required, it is preferable to use one of the lower resolution modes — PMODE3 for colour, PMODE2 for black and white.

Still further "thickening-up" of the lines is achieved in PMODE0, 1 or 2. When operating in one of the coloured PMODES it is possible to specify the colour of the drawn character by using the colour changing instruction of the DRAW command. This means that the letters can be in differing colours within a word, or that different words within a sentence can be different colours.

Similarly, the Angle instruction can be used to control the orientation of the character. This is useful for labelling the axes of graphs, for instance, because of the necessity for vertically-written labels.

Once the characters have been defined, you have a system which is *more* powerful than that available on other home computers which enable the mixing of conventional text with graphics. The speed at which the characters are drawn is slightly faster than the normal reading speed of a child and is quite pleasant to read.

The strings, which are used in a subroutine containing the DRAW command, are contained in a string array A$(n). The subscript "n" has been set as the ASCII value for that character minus 32. This is because all ASCII printed characters start at 32 (decimal).



This now means that calling any of these strings in the array simply needs the calculation of the ASCII value of the required character. Defining the strings only had to be done once, and that was it!

The versatility of the DRAW command can now be made use of. Size, colour and rotation changes of the character can easily be brought about. All the work is done by two subroutines to be found at lines 1000 and 1100. The program listing also includes demonstrations of how the subroutines may be used within programs.

The first demonstration starts at line 2100 and runs to the end of the program. The actions performed are explained as follows:

Line 2110 sets the screen to the highest resolution, clears the screen to white and selects black as the printing colour.

Lines 2120-2180 set all the variables.

The variables needed are as follows:

X = Horizontal position of the left-hand edge of the first character in the string to be printed.

Y = Vertical position of the first line at the level of the base of the capital letters. (That is those without descenders.)

XS = Horizontal steps between characters.

YS = Vertical steps between lines.

SC = Scale of print size. Minimum value of "4" gives the smallest size of character. (These are drawn on a 5 × 9 pixel rectangle on the highest resolution setting, PMODE4.) Any value up to 62 may be used — this will give very large letters, 16 times the minimum size. Suitable values for X, Y, XS and YS must be chosen for each scale change. Attempting to use values of less than four, only gives incomplete characters.

AN = Angle of printing. This is normally set to "0" for ordinary horizontal printing, but will need to be changed, for example, to label the vertical axis of a graph. Values to be used are as follows:

"0" = 0 degrees of rotation
"1" = 90 degrees of rotation
"2" = 180 degrees of rotation
"3" = 270 degrees of rotation

CO = Colour to use in printing. Set to "0" for black on white screen, otherwise use the appropriate Dragon 32 colour code for the PMODE in use at the time.

Line 2190: the string to be printed is defined as LI$, and then the printing subroutine at line 1000 is called. This subroutine in turn calls the character printing subroutine at line 1100 each time a character is to be printed.

Line 2210 sets the variables for the next string to be printed. Note that only those variables which need to be changed in value need be redefined. In this case only the horizontal starting position and the level of the line need be redefined as all the other values stay the same.

Line 2220 defines the next string to be printed. The printing subroutine is called in line 2230.

Lines 2250-2530 give a few examples of how different sizes, colour and thickness of printing may be obtained using different PMODES.

String printing subroutine

Line 1010 sets the number of loops to the number of characters in the string LI$.

Line 1020 decomposes the string LI$ one character at a time and then defines which of the array A$(n) is to be used for the drawing of each character. As all the subscripts used in this array are related to the ASCII value of that character then the ASC command is used.

Line 1040 moves print position up one character, the next line checks to see if the line is full and if it is then it sets the horizontal position back to the right-hand edge and moves down to the next line.

Character printing subroutine

Line 1110 converts all the numerical values into their corresponding string representation for insertion into the DRAW command string used to draw the character in line 1120. ▶

Direct typing routine

◄ At line 1500 another routine is provided to demonstrate another way in which this array of ready-defined characters may be used to type directly on to the graphics screen from the keyboard. This will run if the "" at the beginning of line 2000 is removed before running the program.

Although not obviously a very useful routine this section has some interesting points to it. It could of course be used to create a screenful of text which could subsequently be dumped as a graphics printout providing very large letters if the scale value is set accordingly.

It could also prove quite useful where text could be typed on to the graphics display with the images of words subsequently stored using that marvellous GET command. A detailed explanation of the routine will explain how it works:

Line 1500 puts us in high resolution screen with black letters printed on a white background. This is the easiest mode in which to read the small letters.

Line 1510 sets the starting point for printing on the screen.

Line 1520 samples the keyboard to find out if a key has been pressed, samples memory location 337 (decimal) for use in line 1650 and sets a flashing square cursor on the print position. Exit from this line only occurs if a key has been pressed.

Line 1530 checks to see if key pressed is <ENTER>. If so then GOTO 1630 is performed in order to start the next line.

Line 1540 checks if back-arrow has been pressed and if so causes a single backspace and the call for the next character.

Line 1550 checks to see if <CLEAR> key has been pressed and if so returns us to the start to clear the screen and start again.

Line 1560 sets the appropriate subscript value to select the correct character string from the characters array A$(n) and converts the values of X and Y to their string representation.

Line 1570 checks to see if a letter key has been pressed and if so cause a jump to 1650.

Line 1580 checks to see if an ASCII value of greater than 122 has been selected. This should never happen!

Line 1590 draws the character, and the following lines increment the printing position by one, check for end of a line and, if found, increment the line down one position while returning the horizontal position to the extreme right-hand side of the screen.

Line 1650: if any of the values listed are to be found in memory position 337 decimal (sampled in line 1520) then the <SHIFT> key has been pressed and the strings to DRAW capital letters, or a "shift" is required.

Extra characters

Some extra characters to those available on the standard Dragon 32 keyboard are also provided. On line 130 the first definition string provided is that for a hash "#", however, included in the REM at the end of the line is an extra string to draw a pound sign. This is made available simply by deleting the first part of the line up to the "#".

Lines 690 to 720 contain strings to draw the following characters:

Line 690: a left-hand square bracket which is equivalent to the ASCII 91 (dec) character and is available on the Dragon keyboard using a <SHIFT> <down arrow>.

Line 700: right-hand square bracket (ASCII 93) — a <SHIFT> <right-hand arrow>.

Line 710: a circumflex (ASCII 94) — <up arrow>.

Line 720: underline (ASCII 95) — <SHIFT> <up arrow> 80 s.

A listing complete with all REMs and explanatory notes is given, which if typed in carefully will work well.

Once the principle of the action is understood then all of the lines from 2000 to the end may be deleted along with the explanatory notes provided on lines 1800-1911. The bare program can then be saved and subsequently loaded each time a program needing them is to be written.

I have found this program to be invaluable. Should anyone wish to save themselves the tedium of typing in all those strings correctly then I would only be too pleased to supply them with a copy of the program on cassette if they send £5 to Iolo ap Gwynn, Plas Treflys, Llangwyryfon, Aberystwyth, Dyfed, Wales SY23 4HD. ■

```
1 '*******************************
2 '** FULL ASCII CHARACTER SET **
3 '** FOR USE IN GRAPHICS MODE **
4 '** WITH SUBROUTINES FOR:    **
5 '** 1.DRAWING A CHARACTER    **
6 '** 2.DRAWING A STRING       **
7 '** 3.WRITING DIRECTLY ON THE**
8 '**    GRAPHICS SCREEN.     **
9 '** c I.ap Gwynn 6/83       **
10 '**                        **
11 '** FOLLOW THE INSTRUCTIONS **
12 '** CAREFULLY.             **
13 '*******************************
40 'Sufficient space is cleared for both strings and all graphics pages.These ma
y be modified according to the use made of the program
50 CLEAR 200:PCLEAR8       60 DIM A$(90)
100 A$(0)="BR7":'SPACE
110 A$(1)="BR2R0BU2U4":'!
120 A$(2)="BU4BR1R0U2BR2R0D2":'"
130 A$(3)="BR1R0U6BR2R0D6BR1BU2U0L4BU2U0R4":'#:A$(3)="R0R4BU1BL3L0U4E1R1F1BG2G0L
2":'POUND SIGN
140 A$(4)="BR2R0U6BF1L2G1F1R2F1G1L2":'$
150 A$(5)="U0E1U1E2U1E1BL3L0L1D1RU1BF3BD2D0D1L1U1R1":'%
160 A$(6)="BR1R0R1E2BD2D0H3E2H1L1G1F1D1G1D1F1":'&
170 A$(7)="BU4BR1R0E1U1L1":''
180 A$(8)="BR3R0H2U2E2":'(
190 A$(9)="BR1R0E2U2H2":')
200 A$(10)="BR2R0U6BR1BF1F0G4BR4R0H4BD2D0R4":'*
210 A$(11)="BR2BU1U0U4BF2F0L4":'+
220 A$(12)="BR1R0U1R1D1L1R1D1G1":',
230 A$(13)="BU3U0R4":'-
240 A$(14)="BR2R0U1R1D1L1":'.
250 A$(15)="E0E1U1E2U1E1":'/
260 A$(16)="BU1U0U4E1R2F1D4G1L2H1F1U1E1U2E1U1":'0
270 A$(17)="BR1R0R2L1U6G1":'1
280 A$(18)="R0R4L4E4U1H1L2G1":'2
290 A$(19)="BU1U0F1R2E1U1H2E2L4":'3
300 A$(20)="BR3R0U6G3D1R4":'4
310 A$(21)="BU1U0F1R2E1U2H1L3U2R4":'5
320 A$(22)="BR1R0R2E1U1H1L3E3G3D2F1":'6
330 A$(23)="U0U1E2L1R2L1E2U1L4":'7
340 A$(24)="BR1R0R2E1U1H1L2H1U1E1R2F1D1G1L2G1D1F1":'8
350 A$(25)="BR1R0E3U2H1L2G1D1F1R3":'9
```

continued on page 27



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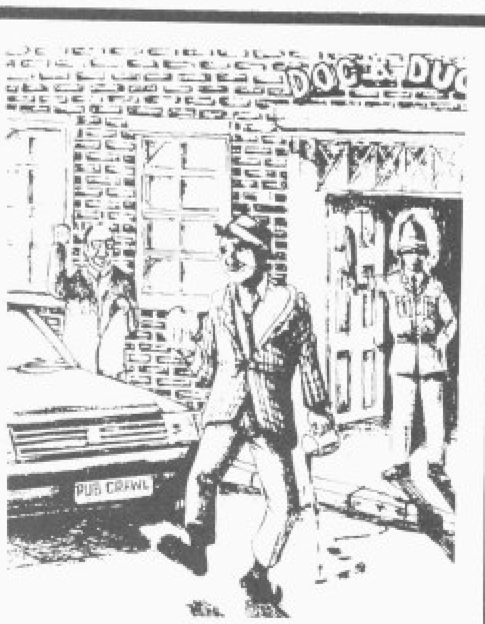
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```
360 A$(26)="BR1R0R1U1L1D1BU3U0U1R1D1L1":':
370 A$(27)="BR1R0U1R1D1L1R1D1G1BU5U0U1R1D1L1":';
380 A$(28)="BR3R0H3E3":'<
390 A$(29)="BU2U0R4BU2U0L4":'=
400 A$(30)="BR1R0E3H3":'>
410 A$(31)="BR2R0BU2U0E2U1H1L2G1":'?
420 A$(32)="BR1R0R2U1L1U2L1G1D1F1R1E2U3H1L2G1":'@
430 A$(33)="U0U4E2F2D4U2L4":'A
440 A$(34)="R0R3E1U1H1L2U3L1R3F1D1G1L2D3":'B
450 A$(35)="BR1R0R2E1BU4U0H1L2G1D4F1":'C
460 A$(36)="R0R3E1U4H1L3R1D6":'D
470 A$(37)="BR4R0L4U3R3L3U3R4":'E
480 A$(38)="U0U3R3L3U3R4":'F
490 A$(39)="BE2BU1U0R2D3L3H1U4E1R2F1":'G
500 A$(40)="U0U6D3R4U3D6":'H
510 A$(41)="R0R4L2U6L2R4":'I
520 A$(42)="BU1U0F1R1E1U5R1L4":'J
530 A$(43)="U0U6BR4R0G3L1R1F3":'K
540 A$(44)="BR4R0L4U6":'L
550 A$(45)="U0U6F2D1U1E2D6":'M
560 A$(46)="U0U6F2D2F2U6":'N
570 A$(47)="BR1R0R2E1U4H1L2G1D4F1":'O
580 A$(48)="U0U6R3F1D1G1L3":'P
590 A$(49)="BR1R0R1E1F1H2F1E1U3H1L2G1D4F1":'Q
600 A$(50)="U0U6R3F1D1G1L3R1F3":'R
610 A$(51)="BU1U0F1R2E1U1H1L2H1U1E1R2F1":'S
620 A$(52)="BR2R0U6L2R4":'T
630 A$(53)="BU6U0D5F1R2E1U5":'U
640 A$(54)="BU6U0D4F2E2U4":'V
650 A$(55)="BU6U0D6E2U1D1F2U6":'W
660 A$(56)="U0U1E4U1BL4L0D1F4D1":'X
670 A$(57)="BR2R0U3H2U1D1F2E2U1":'Y
680 A$(58)="BR4R0L4U1E4U1L4":'Z
690 A$(59)="BR3R0L2U6R2":'LH.SQ.BKT
700 A$(61)="BR1R0R2U6L2":'RH.SQ.BKT
710 A$(62)="BU5U0E1R2F1":'CIRCUMFLEX
720 A$(63)="BD2D0R4":'LINE
730 A$(65)="BU4BR1R0R2D3G1L1H1E1R1F2":'a
740 A$(66)="R0R2E1U2H1L2U2D6":'b
750 A$(67)="BR3R0L2H1U2E1R2":'c
760 A$(68)="BR1R0R2U6D2L2G1D2F1":'d
770 A$(69)="BR3R0L2H1U2E1R2F1D1L4":'e
780 A$(70)="BR1R0U5E1R1BD3D0L3":'f
790 A$(71)="BD2D0R3U6L2G1D2F1R2":'g
800 A$(72)="U0U6D2R3D4":'h
810 A$(73)="BR1R0R2L1U4L1BU2BR1R0":'i
820 A$(74)="BF1F0D1R2U5L1BU2BR1R0":'j
830 A$(75)="U0U6D4R1E2G2F2":'k
840 A$(76)="BR1R0R2L1U6L1":'l
850 A$(77)="U0U3E1R1D4U4R1F1D3":'m
860 A$(78)="U0U4R2F1D3":'n
870 A$(79)="BR1R0R2E1U2H1L2G1D2F1":'o
880 A$(80)="R0R2E1U2H1L2D6":'p
890 A$(81)="BF2BR1R0U6L2G1D2F1R2":'q
900 A$(82)="U0U4F1E1R1":'r
910 A$(83)="R0R3E1H1L2H1E1R2":'s
920 A$(84)="BR3R0L1H1U5D2L1R3":'t
930 A$(85)="BU4U0D3F1R3L1U4":'u
940 A$(86)="BU4U0D1F1D1F1E1U1E1U1":'v
950 A$(87)="BU4U0D3F1E1U1D1F1E1U3":'w
960 A$(88)="E0E4G2H2F4":'x
970 A$(89)="BD2D0E3U1E1U1BL4L0D1F1D1F1":'y
980 A$(90)="BR4R0L4E4L4":'z
990 GOTO2000
1000 'PRINT STRING LABELLED LI$
1010 FORI=1TOLEN(LI$)
1020 CH$=A$(ASC(MID$(LI$,I,1))-32)
1030 GOSUB1100
1040 X=X+XS
1045 IF X+XS>255 THEN X=0:Y=Y+YS
1050 NEXTI
1060 RETURN
1100 'PRINT CHARACTER CH$
1110 X$=STR$(X):Y$=STR$(Y):SC$=STR$(SC):CO$=STR$(CO):AN$=STR$(AN)
1120 DRAW"BM"+X$+","+Y$+"S"+SC$+"C"+CO$+"A"+AN$+CH$
1130 RETURN
1490 'ROUTINE TO PRINT DIRECTLY ON THE GRAPHICS SCREEN USING THE KEYBOARD AS A T
YPEWRITER.NORMALLY LOWER CASE IS SEEN UNLESS THE <SHIFT> KEY IS PRESSED
1500 PMODE4,1:SCREEN1,1:PCLS1:COLOR0,1
1510 X=1:Y=8
1520 Q$=INKEY$:PE=PEEK(337):LINE(X,Y-7)-(X+7,Y),PSET,B:LINE(X,Y-7)-(X+7,Y),PRESE
T,B:IF Q$=""THEN1520
1530 IF ASC(Q$)=13 THEN 1630
1540 IF ASC(Q$)=8 THEN X=X-7:LINE(X,Y-8)-(X+7,Y+2),PRESET,BF:GOTO1520
1550 IF ASC(Q$)=12 THEN 1500
```

continued on page 29

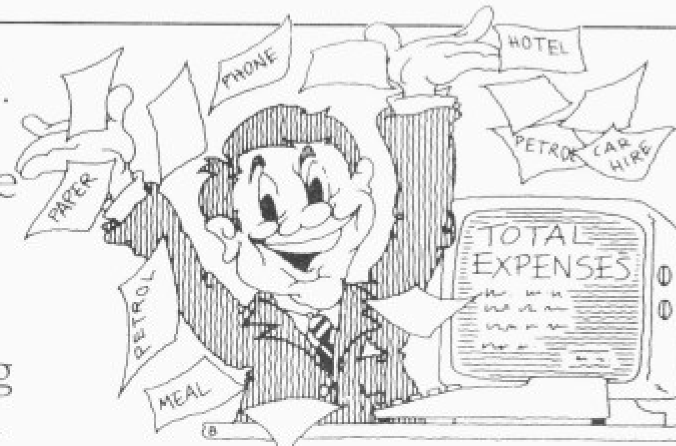
```
1560 N=ASC(Q$)-32:X$=STR$(X):Y$=STR$(Y)
1570 IF N>=33 AND N<=58 THEN 1650
1580 IF N>90 THEN N=64
1590 DRAW"BM"+X$+","+Y$+"S4"+A$(N)
1600 X=X+7
1610 IF X>248 THEN 1630
1620 GOTO 1520
1630 Y=Y+10:X=0
1640 GOTO 1520
1650 IF PE=251 OR PE=247 OR PE=239 OR PE=223 THEN N=N+32
1660 GOTO 1590
1800 'The program is supplied so that when run it will immediately jump to line
1500 and demonstrate direct GRAPHICS SCREEN typing.
1801 'TO STOP THIS SIMPLY DELETE LINE 2000
1802 '
1803 'Deleting line 2000 allows a demonstration of the printing of a string onto
 the GRAPHICS SCREEN to take place.
1804 'Examine lines 2100 on in order to discover how to use these subroutines in
 your own programs.
1900 '
1901 '***DEFINITION OF VARIABLES REQUIRED TO USE THE SUBROUTINES AT LINES 1000 A
ND 1100 ARE AS FOLLOWS:
1902 '* X=HORIZONTAL POSITION OF L.H.EDGE OF CHARACTER
1903 '* Y=VERTICAL POSITION OF THIRD PIXEL UP FROM THE BOTTOM OF THE CHARACTER-t
his is the bottom line of the capital letters.
1904 '* XS=HORIZONTAL STEPS BETWEEN CHARACTERS
1905 '* YS=VERTICAL STEPS BETWEEN LINES
1906 '* SC=SCALE  VALUE OF "4" GIVES THE SMALLEST SIZE(AS DEMONSTRATED IN DIRECT
 SCREEN TYPING).ANY VALUES UP TO 63 MAY BE USED,REMEMEMBERING OF COURSE TO USE S
UITABLE "X","Y","XS"AND"YS"VALUES.
1907 '* AN=ANGLE  NORMALLY SET TO "0",VALUES OF "1","2"AND"3" GIVE A DISPLACEMEN
T OF 90,180 AND 270 DEGREES RESPECTIVELY.
1908 '* CO=COLOUR TO USE. SET TO "0" FOR BLACK ON WHITE AS IN DEMONSTRATION,OTHE
RWISE USE APPROPRIATE DRAGON COLOUR CODE FOR MODE IN USE AT THE TIME.
1910 '
1911 'START PROGRAM AT LINE 2000 AND WHEN COMPLETE YOU MAY THEN DELETE EXPLANATO
RY NOTES
2000 'GOTO1500:'DELETE THIS LINE TO DISABLE DEMONSTRATION
2100 'USE OF STRING PRINTING SUBROUTINE
2110 PMODE4,1:SCREEN1,1:PCLS1:COLOR0,1
2120 X=0:'DEFINE START POSITION
2130 Y=50:'POSITION OF FIRST LINE
2140 XS=6:'STEP BETWEEN CHARS
2150 YS=10:'STEP BETWEEN LINES
2160 SC=4:'SET SIZE OF CHARACTER
2170 AN=0:'SET ANGLE
2180 CO=0:'SET COLOUR
2190 LI$="This is a demonstration of a string being printed onto the GRAPHICS SC
REEN,any       standard ASCII character may be used":GOSUB 1000
2200 FOR PA=0 TO 2000:NEXT PA
2210 X=0:Y=110
2220 LI$=" !#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijkl
mnopqrstuvwxyz"
2230 GOSUB1000
2240 FOR PA=0 TO 3000:NEXT PA
2250 'NOW EXPERIMENT WITH DIFFERENT MODES AND SIZES
2260 PCLS1:X=0:Y=100:XS=12:YS=20:SC=8
2270 LI$="Now for a different   size !":GOSUB1000
2280 FOR PA=0 TO 3000:NEXT PA
2290 PMODE2,1:SCREEN1,1:PCLS1:COLOR0,1
2300 X=0:Y=100
2310 LI$="Or another mode ?":GOSUB1000
2320 FOR PA=0 TO 3000:NEXT PA
2330 PMODE0,1:SCREEN1,1:PCLS1
2340 X=0:Y=100
2350 LI$="And another !":GOSUB1000
2360 FOR PA=0 TO 3000:NEXT PA
2370 PMODE3,1:SCREEN1,0:PCLS2:COLOR4,2
2380 X=0:Y=20:CO=4
2390 LI$="Now it is up to":GOSUB1000
2400 X=0:Y=40:CO=3
2410 LI$=">>> YOU !!":GOSUB1000
2420 X=0:Y=80:CO=1
2430 LI$="Just delete lines":GOSUB1000
2440 X=0:Y=100
2450 LI$="2000 on, and ":GOSUB1000
2460 X=0:Y=120:CO=4
2470 LI$="START ":GOSUB1000
2480 CO=3:LI$="YOUR program":GOSUB1000
2490 X=0:Y=140
2500 LI$="AT LINE 2000.":GOSUB1000
2510 LINE(0,150)-(255,191),PSET,BF
2520 X=0:Y=180:XS=18:SC=12:CO=2
2530 LI$="  HAVE FUN !":GOSUB1000
3000 GOTO 3000
```

1. KEEP TRACK OF THE GOLF CLUB ACCOUNTS.
The GEC Dragon RMS program will record all the details, and prepare the accounts beautifully typed at the end of the year. (Or any other time.)

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Whether you're in business or not, the Dragon will give you an accurate picture of your assets (or liabilities) almost instantly.

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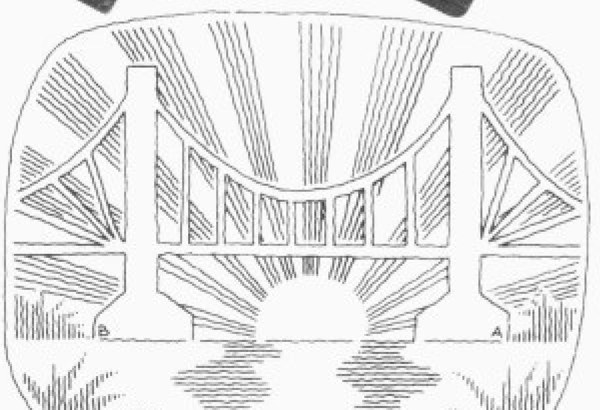


3. MAKE SURE THE CASH FLOWS IN, AS WELL AS OUT.
With the Sales and Purchase program soon to be available, you'll have complete control over your company's cash flow.

4. LEARN TO PROGRAM IN PASCAL, C, OR BASIC.
Although it's childsplay to use, the GEC Dragon is certainly not limited to games. In fact it has as much brain power as some computers that cost thousands.

7. SEND A SHIRTY LETTER TO THE BANK MANAGER FOR A CHANGE.
You should enjoy this. The Dragon is a big ally when it comes to personal finance. It'll keep you permanently one step ahead of your bank statements.





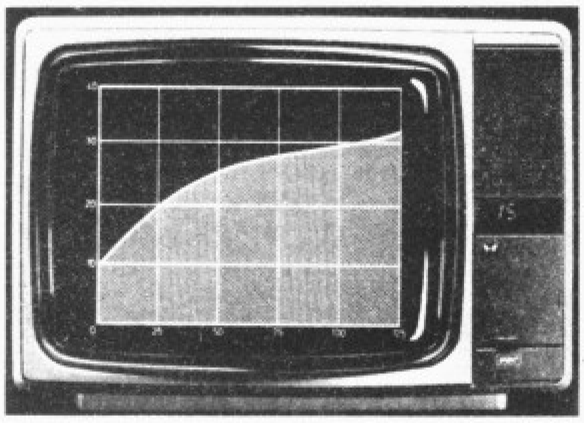
9. DESIGN A BRIDGE.
GEC Dragon's UNIX-like software (based on programs which were specifically designed for universities) will help you perform stress analysis, quantity surveying and many more complex functions.

10. FIND A CURE FOR AMNESIA.

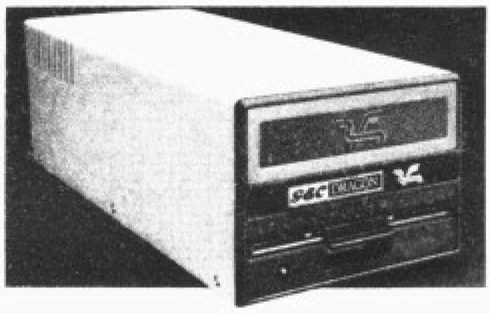
By keeping a personal diary, the GEC Dragon can also help you avoid life's bigger crises. (Like reminding you of your anniversary before your wife does.)

11. FLY TO THE MOON.

While you're taking it easy with all the spare time your Dragon has created, there are literally hundreds of space adventures and other games to pass the time.

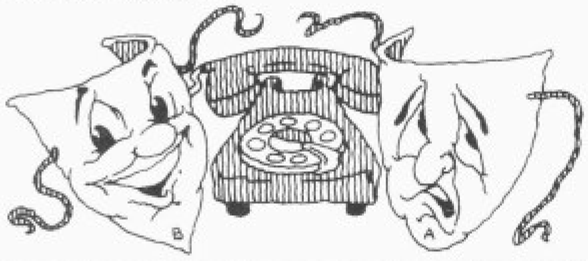






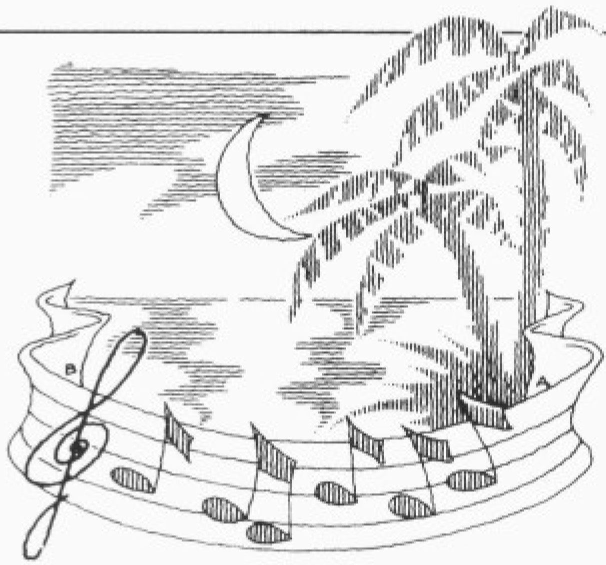
12. CURE THE IMPEDIMENT IN YOUR REACH.

By linking your Dragon to Prestel and the telephone, you'll have immediate access to the very latest information on travel and exchange rates. You can even book up for plays and the theatre.



13. COMPOSE A MOONLIGHT SONATA — ANY TIME OF DAY.

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It's no dumb computer, either — you can even get it to talk to you.

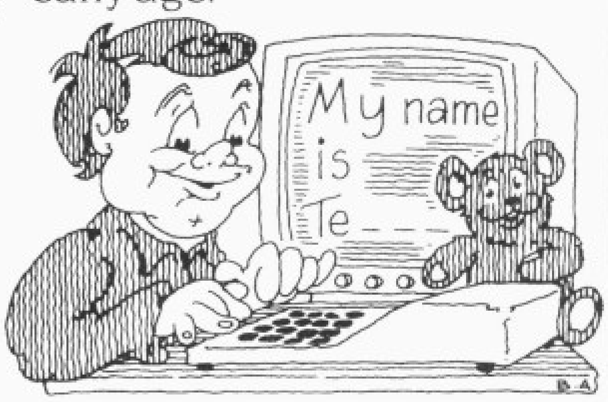


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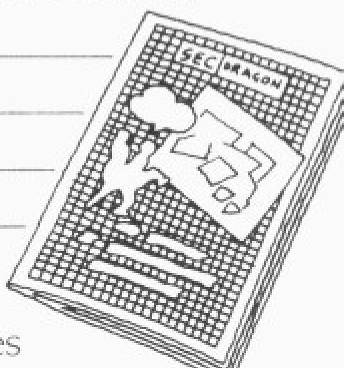
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DU2

For book worms

Mike Harrison *looks at two advanced books for the Dragon*

FINDING THE "right" book to complement your Dragon is not an easy task given the diversity of literature available.

In last month's review I tried to give a good idea of what to expect from a variety of introductory and advanced books for the Dragon. Continuing on from this I have picked two more "second level" books, read them thoroughly, typed in some of the listings and sifted out items which I think will be of interest to readers.

Again, as in my previous review, a disclaimer is needed, as one of the books is published by Sunshine — publishers of *Dragon User*. My only connection with the company is as a freelance writer and my comments are made totally independently of the company.

I was very impressed with Keith and Steven Brain's *Advanced Sound & Graphics* (Sunshine Publications). I'm convinced that whatever else people use their computers for, pictures and sound are by far the most important. Young children spend hours creating colourful screens and trying to get their Dragons to zap and ping. Middle-aged children too, however puritanically they claim to be problem solving and data processing, have been known to load in the odd graphic adventure. So by devoting 250 pages to the handling of just graphics and sound allows the Brains to go in depth to the core of the machine's popularity.

Versatile

The Dragon has very useful capabilities in this area and the Basic has powerful commands, but, the very range and versatility of its implementation can be a barrier to the novice, making everything seem complicated.

The book therefore sets out to teach you not only the first principles involved but also the best ways to use the commands. It is therefore both a primer and an advanced text and contains tools and full programs. Wherever possible relevant copies of the hi-res screen are included to illustrate each point.

From the first chapter to the last Keith and Steven keep you informed of the ways you can put your Basic routines to work. Here are a few sound effects from Chapter 1:

```
10 PLAY "V1"
20 PLAY "L2T4 FGV+"
30 L=L+1:IF L<30 THEN 20
40 PLAY "T255L255CDEFGABAGFEDC:
GOTO 40
```

which is like Dr. Who meets the Z Cars.

The section introducing high resolution goes into the memory requirements of setting up the PMODEs and how you can set different PMODEs in different pages. For example we could reserve 5 pages and set these aside as follows: a) one page for PMODE 0, b) two pages for PMODE 1, and c) two pages for PMODE 2 (see illustration).

This can be done with instruction:

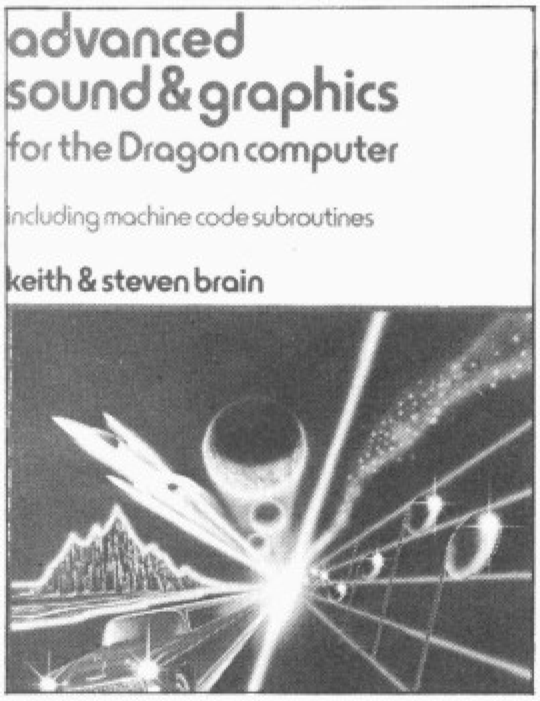
```
10 PCLEAR 5:PMODE 0,1:PCLS:PMODE 1,2:PCL 5:PMODE 2,4:PCLS
```

Some interesting time comparisons are given. LINE ... BF for example is more than twice as fast as LINE ... PAINT which will do the same job. However, where PAINT is so powerful is in the filling of irregular shapes and the ease with which its colour can be set. A general discussion of the PAINT command brings out some relevant and pertinent points, where difficulties arise:

(1) Nothing happens
(2) Paint gets everywhere

The authors explain that the former often occurs because the origin is set within a border so painting finishes before it begins. Dragon paint is very corrosive so will leak out of any pinhole to cause the second problem. Another cause is that the PAINT command looks to only one border colour so programmers need to specify paint limitations carefully. Some interesting uses of the CIRCLE perimeters are explored giving spirals, elliptical spirals and flying saucers by altering variables in execution of the command.

Combining graphics commands the authors show how a wide assortment of them can be most effectively used. Pic-Man complete with revolving tie is built in this way; even his remains left after the explosion tell a tale.



Having shown you the way to create your characters, Keith and Steven teach you how to move it about, copy it from one screen to another and give the outline of a Basic program for you to get a hard copy of the screen on your printer. GET and PUT are cleverly described with methods for calculating the size of the array to be dimensioned and times given for PUTting with and without graphic details (the "G" parameter). I think we need a computer program to work out the most efficient of all these methods for dimensioning arrays — or better still an automatic DIM to be carried out whenever GET is used. Until we get that though, use any one of these, they are all better than the one in the manual.

Hands up all those whose PUTs have ended up as striped wavy boxes on the screen. The authors have thought of you and a section is devoted to telling you what you did wrong. They also include a program to show you the effect of those action parameters following PUT.

Amusing

A great deal of interest and amusement was around in our house by the simple expedient of saving screens on tape. Using the book's list of memory locations you can save the screen in any mode — here is one example:

1) RUN your program until you see an interesting PMODE 3,1 screen.
2) Hit BREAK and type in as a direct command (when your tape is ready) CSAVEM"PICTURE",1536,7679,6144
3) When OK has appeared, switch off your Dragon and then start up again

```
10 PMODE 3,1:SCREEN 1,0:PCLS
20 CLOAD M
30 GOTO 30
```

4) When you have rewound the tape type in RUN.

Your screen will fill line by line with your picture, loading in directly from cassette. Apart from the interesting effect, the potential of this soon occurs to you. Some graphics designs take a very long time to build up so why not save the whole picture as machine code data and call it from your program GETting and PUTting from that screen. Another use of this technique is to build up a dummy program giving users a title page, rules or instructions to read whilst a CLOAD instruction embedded in your list is loading in the main program. The book gives the memory locations of each page and more tips on how to make best use of this routine.

A chapter on three dimensions gives listings for a 3D-box section, a tube and 3-D plotting. Guidance is given on the foreshortening calculations needed for such effects. Rotation of images is also covered. Unfortunately these two features are not put together so that 3D shapes can be made to spin in mid-air — but I suppose they have to leave something for the reader to do.

Instant keyboard access to hi-res commands is useful in that you can change ▶

◀ ideas easily as you go, so *Advanced Sound & Graphics* equips you with this ability in a long detailed program. This allows you to move and draw, rub out and access box, line, circle and eclipse from single keystrokes. Areas of the screen can be replicated and backups made with designs in various colours in the same manner. It also draws text characters on the hi-res screen. A nice touch is that whenever PAINT is called, an automatic backup is made so that in case of disaster all is not lost. Your previous position can be re-instated and you can try again. Of course to use such a facility you need a constant update on the current cursor position and so you are provided with this in a non-destructive mode. Drawing with the joystick is also possible, so this well designed program has the facilities of many expensive packages sold on tape.

You may transfer these characters between programs by saving them as machine code data. The extraordinary speed of this process is demonstrated, as well as the production of a 42 x 24 display of text. The number of characters per line can in fact be pushed up to 51 at the expense of some legibility.

Animation

When you want your figures to move it is important to animate them to mimic real actions. Keith and Steven describe a number of ways in which this can be done. By far the smoothest, especially where we need to preserve a background across which the character will pass, is to use PUT with logical action parameters. A running figure is made to jog across a lined screen as the authors demonstrate the sequence of actions necessary to preserve both the runner's motion and the background. The degree of realism in animation depends on the accuracy of the frames, of course, but also on the number of frames in the sequence. A six-frame bird in flight touches down very nicely to end the chapter.

You can turn your Dragon into a sound synthesiser, reconfigurating the keyboard and creating sound envelopes; or use the graphic music editor to enter a piece of music, display it in standard musical notation and then play it back. *Advanced Sound & Graphics* finally takes you beyond Basic. It shows you how to POKE into memory and modify a program whilst it is still running (for example to change an action parameter in PUT) and consequently massive savings in memory result. It also takes you to the semigraphic modes to boldly POKE where no bloke has POKEd before (see program listing).

This program is cannibalised from one in which the authors show you semigraphic modes 8,12 and 24. They go on to introduce the calling of machine code subroutines from within Basic programs and give a few to type in either by means of a given assembler routine or through a commercial assembler. The first ones give some simple sounds and set up a "sound table" so you can define "phasers" and "zaps" to be called from memory. The text screen, or just part of it, can be inverted by another routine, a partial PCLS can be achieved and the hi-res screen can be scrolled up and down by others.

```
10 CLS8:PMODE4,1:PCLS1:M=255
40 POKE 65472,0:POKE 65475,1:POKE65477,1
:M$="SEMIGRAPHICS 24":GOSUB100
50 X=3840:M$="FROM ADVANCED SOUND & GRAP
HICS":GOSUB 200
60 GOTO 60
100 FOR LN=1 TO 191
110 FOR CL=0 TO 31
120 POKE 1024+LN*32+CL,RND(127)+128
130 NEXT CL,LN
200 CO=0:FORN=1 TO LEN(M$):M=ASC(MID$(M$
,N,1))
210 FOR CH=1 TO 384 STEP 32
220 POKE1024+CH+CO+X,M
230 NEXT CH:CO=CO+1:NEXT N
300 RETURN
```

A cannibalised program listing from Advanced Sound & Graphics showing Semigraphic modes.

This excellent book will take anyone who is familiar with the machine to the verge of machine code programming in just the areas with the most potential. It is light enough to read tucked up in bed, yet contains sufficient meat to keep beside your Dragon and help you out of difficulties. One of the magic things about computing is the sparking-off effect. Once you find out how to do something it is next to no time before ideas come flooding in as to its applications. This usually then leads to even more questions — *Advanced Sound & Graphics* can be relied upon to supply the answers.

If, however, you are into the truly technical then you are going to demand more than just programming advice. The nature of the machine itself is the back-cloth for *Inside the Dragon* by Duncan Smeed and Ian Sommerville (Addison-Wesley Publishers), a book for the hobbyist/enthusiast. The micro-buff will find everything laid out bare in 355 pages of solid detailed print — not one photograph or screen dump — exploring every aspect of the hardware.

The authors' complaint as to the weak descriptive documentation provided with the machine, they say, is of no real hardship to the games player. It is the hobbyist who has a tough time finding out the technical details of the system. This book is intended for such a market: those who have fully explored the Basic programming capabiities of their machine and now want to go further. As such, it deals with the internal workings of the micro rather than about programming.

Duncan and Ian describe the M6809 processor and show how machine code programs for that chip can be written in assembly language. They describe the graphics system and give bits and pieces of technical information of value to assembly code programmers, and go to great lengths to explain the general techniques and then make them Dragon specific — so really useful skills can be learnt.

The number crunching that takes place "under the bonnet" is in binary notation in a computer. Duncan and Ian's first task then is to show the reader how the machine handles subtraction in twos complement arithmetic. Unfortunately the sequences of 1s and 0s which make up binary numbers are very awkward for people to use, so when it is necessary to talk in the computers own terms a shorthand version, hexadecimal, is the compromise. Thus hexadecimal numbers are discussed along with the organisation of data through resistors and stacks. The processor can access information in a register more quickly than it can access information in a memory cell and general purpose processor registers should therefore be used to hold frequently accessed information.

The Dragon's hardware is made up of about 20 microchips and their interconnections plus a power supply, peripheral device connectors and so on. There is enough meat here to keep the electronics buff happy for years and the authors set about the task with dedication. The hardware is described as if it is composed of three interconnecting sub-systems, namely: the Processor, the Memory and the Input/Output System.

Architecture

The architecture of the processor has two whole chapters devoted to it. Its index registers, the U and S stack pointer registers, direct page registers and the M6809's program counter are all detailed. The M6809's data highways are 8 bits wide (or 8-bit processor) but some instructions operate on 16 bits which considerably increases its power and means that programs can be written using fewer instructions and executed more quickly. Because of this and the variety of ways in which memory can be accessed, the M6809 is called a second generation microprocessor or sometimes, more extravagantly, the "programmers' dream machine" Those aspects of the M6809 machine architecture which are of importance to Dragon machine code prog- ▶

◀ rammers are given in detail in this section. A memory map is also provided.

In assembly language programming the programmer writes his program as a sequence of absolute directives to the processor. An introduction to assembly language begins by a comparison between high and low level programming. High level programming is much easier than low-level because machine architectures are inherently complex. The low-level programmer must master all these complexities to avoid programming errors, whereas using Basic or similar he could concentrate on getting right the logic of the program itself. Despite this the authors bring out some powerful reasons for using assembly language. The programmer has complete control over the machine: if he wishes to use his own particular way of manipulating characters or to access hardware features in some non-standard way this becomes possible. Assembly language is much faster than Basic by 100 to 1000 times as the 'translation phase' is omitted. And it takes up less memory.

Multi-stage

They give a multi-stage approach which goes from the general written solution to the problem to Basic. From here they suggest you translate it, by hand, to assembly code. This is quite a straightforward process for they give the assembly language equivalents to Basic statements in their book.

Sometimes it isn't necessary to translate the whole program into assembly code. Perhaps you have, say, a display section, where the program spends most of its time. If you encode just this section the desired speed-up effect can be achieved and the machine code called from your Basic program. A whole section is devoted to achieving this.

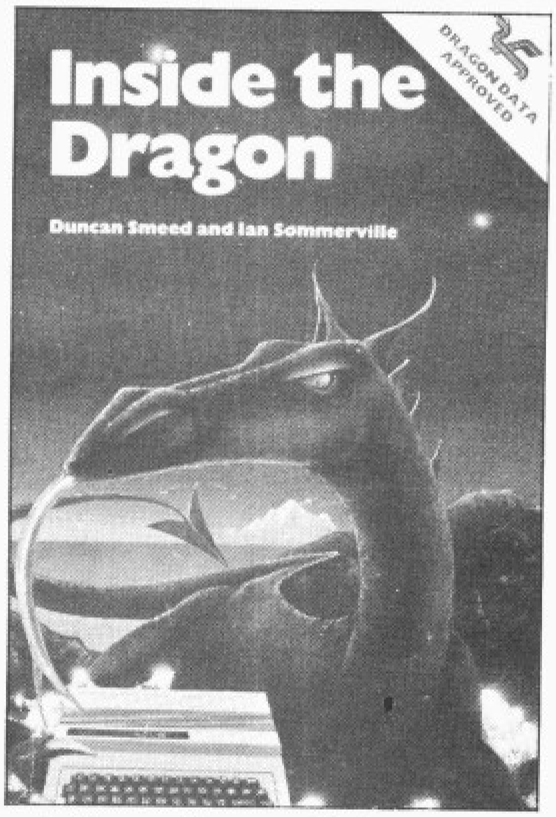
The final stage in this sequence is to eliminate redundant statements and then assemble it. This means translate it into machine code. To do this is not a difficult process as it simply requires the program to look up tables of names and associated hexadecimal values. For humans this is a slow, tiresome, error-prone task but it is the kind of job computers excel at. To buy an assembler program then makes a lot of sense.

The particular assembler whose facilities are described in detail in the book is Dream (from Dragon Data) and this was also the one I used to enter the authors' demonstration programs. The assembler is easy to use and has a great variety of extra commands to simplify the creation of machine code files from assembly language text. Its editing facilities allow the user to search out and change unwanted strings, and sections of text can be marked and then replicated or saved to tape.

One problem I had with Dream was that saving the text to tape did not make a copy such that it could be subsequently reloaded at a future date. The solution, which might be of interest to other Dream purchasers, was to POKE &H745B,255:POKE &H746B,128 and this gave a sufficiently long leader to correct the problem. With these POKEs installed I saved a copy of NewDream by CSAVE M "NEWDREAM", 27776,32767,27776 and used this in subsequent runs.

Duncan and Ian go on to describe the label, mnemonic, operand and comments fields and the way Dream handles their implementation. They show how commonly used programming constructs, such as assignments, loops and conditional statements, may be programmed in assembly language. The approach used is to take Basic statements implementing these constructs and show how assembly language equivalents to these can be built up.

The next chapter looks at more advanced aspects of assembly language programming. They describe a general-purpose technique for implementing subroutines and show how character strings may be represented and manipulated. They also tell the reader how to link such subroutines with Basic programs and how to write assembly code which is position independent.



In the section on "Subroutines and Strings" emphasis is placed on the role of subroutines in programming where the user only has to determine the solution to one problem at a time. These solutions are then integrated and co-ordinated to make the general solution — the computer program. Subroutines in Basic, however, have severe drawbacks.

Program variables are global depending on the whole rather than local needs and therefore the subroutine is difficult to isolate from its environment. There is also no way that a Basic subroutine can have its own private data area which cannot be tampered with, so the programmer can never be sure that a call to the subroutine at any stage will produce the desired result. Assembly language, however, can create conditions where purely local parameters can be passed and used along with private data areas. The M6809's architecture is shown to be well suited to the implementation of self-contained subroutines and the authors describe a very general way of declaring and then calling such. They also describe a calling technique which can be used when execution speed is the paramount consideration.

A useful table which lists the vector addresses with each USR call is given as follows:

USR call	USR vector
USR0	134:135
USR1	136:137
USR2	138:139
USR3	13A:13B
USR4	13C:13D
USR5	13E:13F
USR6	140:141
USR7	142:143
USR8	144:145
USR9	146:147

and they also state a way round the built in interpreter bug which translates every USR call as USR0. Success is gained by padding the digit with an extra zero (that is, USR06, USR02 and so on). Examples of USR calls are:

```
10 DEF USR0= &H1000:DEF USR1=
&H2000
20 A=USR00(A): 'Transfers control to
&H1000
30 IF USR01(0)=0 THEN B=B+1
```

Graphics

A very large part of the Dragon's Basic system is dedicated to providing graphic facilities and it's not an easy task to duplicate these as machine code routines. However, the speed of Basic especially in its graphics commands is so slow that it is impossible to use an all Basic program in anything but the simplest game if it is to give any sort of challenge to the player. Once again Duncan and Ian push towards the compromise of the Basic machine code mix using the latter for time-critical parts of the program. They teach you how to design, code and animate and the use of all 14 graphic and semigraphic modes. This chapter also discusses in some detail the Dragon's graphics hardware and how by reconfiguring the VDG chip all modes can be accessed.

The VDG scans the video RAM (about 50 times/second) to build up an image on the screen. Although the VDG chip supports 4 different alphanumeric modes the Dragon hardware is only designed to make use of one of these. Further ROM chips need to be installed to use them and some experimentation is suggested. As well as this, *Inside the Dragon* discusses the display of alphanumerics alongside the semigraphics blocks opening up more creative possibilities to the graphics programmer. They also explain that the ROM built into VDG only holds 64 bits and that's what caused the lack of lower case on the machine.

Electronics hobbyists who want to connect their own devices to the I/O sockets are well catered for in a whole chapter on input/output programming. Data sheets from the chip manufacturers are reproduced giving complete details of chip functions and signals.

The book initially discusses the basics ▶

◀ of I/O programming and covers the concepts involved in I/O techniques. Later it details the I/O system concentrating on the PIA chip (principal interface controller) and the various ports built in.

Fundamental

The concept of interrupts is of fundamental importance because it is in this manner than I/O devices signal their messages to the chip. In all there are seven levels of interrupt on the 6809 and they are located and vectored in this chapter along with the priorities of interruption. There are three techniques: unconditional, polled, and interrupt-driven I/O transfer (which does without "busy-wait"). Examples of the use of each are given. The topic of input/output programming is one often neglected in books like this, for the reason that the subject is so detailed and complex that it is difficult to present a coherent overview of it. The authors do just this.

For example, LPOUT the standard Dragon printer output routine addressed through location 800F is excellently explained. So are the handshake lines coordinating data transfer to the printer. As an example of how the line printer routine may be reconfigured, the following Basic direct statements set up the printer width to be the same as the Dragon's display width:

```
POKE ∝H148,0
POKE ∝H9B,32
LLIST
```

The TXLPCH with entry at location BCF5 is a no frills character pumper which can be used as an alternative.

When discussing sound, Ian and Duncan point out that some upper frequency range sounds are restricted in Basic and so they present a subroutine for DAC (digital analogue converter) sound generation. This is also the sound source used to generate the appropriate sine waves of 1200HZ and 2400HZ, with the signal attenuated to about 1V to produce data for the recording of progams/files and other items on tape. A useful tip in this area is to POKE values into ∝H90 before CSAVEing. By POKEing a value of one the leader is made three times longer, and two makes it five times longer. The advantage of this is that it gives the cassette recorder's automatic volume control more time to stabilise thus reducing the probability of cassette I/O errors.

Joysticks and the cartridge expansion port including a description of signals available at the expansion port connector, end this chapter.

Before I end my report on this highly detailed and technical book a mention should be made of "Dragon hints and tips". The authors describe exactly what happens on "power-up" and how Basic programs and data are stored. A useful tip to those who want a cold start from say a machine code program (in order to preserve some graphics for example) is to POKE ∝H71,0 before you start. It works with about a third of my programs. They also show you how to pass parameters to assembly language routines and how to add new commands to Basic. A listing for a "dump program" to compress your Basic programs by using tokens for reserved words is given. This will also cause them to execute more quickly.

A complete list of reserved words, associated tokens and dispatch addresses will be found in the book.

According to the Dragon manual, the parameters to a USR call may be either a number or a string. However, as readers may well have discovered, experimentation shows that TM Errors are the result of trying to pass string arguments. The authors show you how to pass numeric arguments and how to get round the system bug described above. Finally, they show how to add a "HELP" command to the Basic at your disposal, which may be modified for your own use.

Value for money

This very thorough book ends with 100 pages of appendices including a data sheet for MC6809E, technical details of the disk operating system, Dragon specific labels and notes of value to those who own or hope to own the Dragon 64. This really is the piéce de resistance of books for Dragon owners who want detailed technical information about the nature of the beast inside their machine lids. At £7.95 it is excellent value for money and if you also buy a Dream assembler/editor it should put you well on the way to producing quality machine code programs.

To round off my series of reviews, next month I hope to look at three books which deal with machine code languages.■

OPEN FILE FOR DRAGON USERS

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a cassette and, if possible, a printout. We pay £6 for each bug-free program published, double for the program of the month. If you have any problems with the listings, please send your queries to the appropriate author, *Dragon User*, 12-13 Little Newport Street, London WC2R 3LD.

Connect four

From Adam Stevens in Bristol

CONNECT FOUR is a strategy game played against the Dragon. The player chooses whether to go first or second. Instructions are included in the program.

```
0 '****connect four****'
1 '**BY ADAM STEVENS.**'
2 '**(C) copyright'84**'
10 CLS
20 DIM B(8,7),N(7)
30 DIM M(42),G(42),R(42)
40 DIM K(7)
50 CW=0:PW=0
60 CLS:PRINT@230,"INSTRUCTIONS (Y/
N)?"
70 INPUTX$:IFLEFT$(X$,1)="N"THEN80
ELSEGOSUB1350
80 CLS
90 PRINT@195,"PLAYER(P) OR COMPUTE
R(C)"
100 PRINT@235,"TO START";
110 INPUT X$
120 K(0)=0:K(1)=1
130 K(2)=1:K(3)=0
140 K(4)=1:K(5)=1
150 K(6)=1:K(7)=-1
160 FOR I=0 TO 8
170 B(I,0)=9:B(I,7)=9
180 NEXT I
190 FOR I=0 TO 7
200 B(0,I)=9:B(8,I)=9
210 NEXT I
220 J=1:IF X$="C" THEN J=2
230 FOR I=0 TO 42
240 G(I)=J:J=2/J
250 NEXT I
260 T=0
270 DEF FNC(X)=32*X-16
280 DEF FNR(X)=208-32*X
290 PMODE 3,1:SCREEN 1,0
300 COLOR 2,1:PCLS
310 FOR I=0 TO 224 STEP 32
320 LINE(0,0)-(I,192),PSET,B
330 NEXT I
340 LINE(0,0)-(224,0),PRESET
350 IF X$="C" THEN 610
360 FOR I=1 TO 7
370 IF N(I)=6 THEN 430
380 C1=I:R1=N(I)+1:P1=2:GOSUB1060
390 FOR J=1 TO 100
400 X$=INKEY$:IF X$<>"" THEN 450
410 NEXT J
420 PAINT(X1,Y1),1,1
430 NEXT I
440 GOTO 360
450 T=T+1
460 N(I)=N(I)+1
470 B(I,N(I))=2
480 C2=I:R2=N(I):GOSUB1120
490 IF V2=0 THEN 740
500 GOSUB1270
510 FOR I=160 TO 80 STEP-10
520 FOR J=20 TO -20 STEP-1
530 SOUND I+J,1
540 NEXT J
550 FOR J=-20 TO 9
560 SOUND I+J,1
570 NEXT J
580 NEXT I
590 PW=PW+1
600 GOTO 1290
610 C1=RND(7):IF N(C1)=6 THEN 610
620 R1=N(C1)+1
630 P1=1:GOSUB1060
640 B(C1,R1)=1:N(C1)=N(C1)+1
650 T=T+1
660 C2=C1:R2=R1:GOSUB1120
670 IF V2=0 THEN 360
680 GOSUB1270
690 FOR I=1 TO 10
700 PLAY"L8CEG"
710 NEXT I
720 CW=CW+1
730 GOTO 1290
740 FOR C2=1 TO 7
750 IF N(C2)=6 THEN 810
760 R2=N(C2)+1
770 B(C2,R2)=1
780 GOSUB1120
790 IF V2=1 THEN 830
800 B(C2,R2)=0
```

Continued on page 40

```
810 NEXT C2
820 GOTO 840
830 C1=C2:R1=R2:GOTO630
840 FOR C2=1 TO 7
850 IF N(C2)=6 THEN 910
860 R2=N(C2)+1
870 B(C2,R2)=2
880 GOSUB1120
890 IF V2=1 THEN 930
900 B(C2,R2)=0
910 NEXT C2
920 GOTO940
930 C1=C2:R1=R2:GOTO630
940 FOR C9=1 TO 25
950 C2=RND(7)
960 IF N(C2)=6 THEN 1030
970 R2=N(C2)+2
980 IF R2=7 THEN 1050
990 B(C2,R2)=2
1000 GOSUB1120
1010 B(C2,R2)=0
1020 IF V2=0 THEN 1050
1030 NEXT C9
1040 GOTO 610
1050 C1=C2:R1=R2-1:GOTO630
1060 X1=FNC(C1)
1070 Y1=FNR(R1)
1080 CIRCLE(X1,Y1),12,2+P1
1090 PAINT(X1,Y1),2+P1,2+P1
1100 SOUND 40*P1,3
1110 RETURN
1120 S2=B(C2,R2)
1130 FOR D2=1 TO 7 STEP 2
1140 X2=C2:Y2=R2
1150 C4=X2:R4=Y2
1160 X2=X2+K(D2-1):Y2=Y2+K(D2)
1170 IF S2=B(X2,Y2) THEN 1150
1180 L2=0
1190 X2=X2-K(D2-1):Y2=Y2-K(D2)
1200 IF S2<>B(X2,Y2) THEN 1240
1210 C5=X2:R5=Y2
1220 L2=L2+1
1230 GOTO 1190
1240 IF L2>=4 THEN V2=1:RETURN
1250 NEXT D2
1260 V2=0:RETURN
1270 LINE(FNC(C4),FNR(R4))-(FNC(C5
),FNR(R5)),PSET
1280 RETURN
1290 CLS
1300 IF PW=1 THEN PRINT @ 160,"YOU
 WON, TO GO AGAIN PRESS 'Y'"
1310 IF CW=1 THEN PRINT @ 160,"YOU
 LOST, TO GO AGAIN PRESS 'Y'"
1320 POKE 65314,8
1330 D$=INKEY$:IF D$="Y" THEN RUN
ELSE IF D$="N" THEN 1340 ELSE 1330
1340 CLS:END
1350 CLS:PRINT"    I N S T R U C T
 I O N S "
1360 PRINT"     ------------------
----
1370 PRINT:PRINT"  THIS COMPUTER V
ERSION IS JUST LIKE THE ORIGIONAL
VERSION. TO  MAKE YOUR COUNTER STO
P SIMPLY   PRESS THE SPACE-BAR. YO
U ARE THERED COUNTERS AND THE COMP
UTER ISTHE BLUE ONES. YOU HAVE THE
     OPTION TO MAKE THE COMPUTER G
O  FIRST OR TO";
1380 PRINT" START YOURSELF."
1390 PRINT@480," press any key to
play the game";
1400 IF INKEY$=""THEN 1400 ELSE RE
TURN
```

Directory

From M McPartlin in Cleveland

I READ in the October edition of *Dragon User* an article for saving programs on to a master tape, which I found very useful, but also frustrating in that I have great difficulty in setting the desired program quickly. For example, on one side of a C-90 tape I have 20 programs and to load program 15, takes 20 or so minutes. As a result I have taken the liberty of modifying the program to "directory with fast forward search."

Type in the program as listed, substituting your own titles with those I have listed. CSAVE the program in the normal way by typing CSAVE "DIR". Then type in new, remove the tape but do not rewind. The tape is set at the correct position for loading the first item listed on your MENU. CLOAD the first program listed on your MENU, and after CLOADing replace your "DIR" program tape and CSAVE as normal. Rewind the tape back to the beginning, then type in new.

This places your first program immediately after "DIR". Now CLOAD "DIR", then select from your menu, item two. You will be greeted with the prompt "PRESS FAST FORWARD THEN PRESS SPACEBAR".

After following these instructions the cassette recorder will run, then stop at the appropriate position for loading item two, followed by another prompt "PRESS THE PLAY BUTTON. THEN PRESS THE SPACEBAR". Carry out these instructions allowing the cassette recorder to run for two or three seconds before stopping it; the reason being to allow a safety margin on the tape in case it overshoots.

You can now CLOAD item two of your MENU and repeat the procedure as for item one. Carry out this routine until your MENU is complete.

Once the menu is completed all you have to do is CLOAD "DIR", run the program, choose from the menu and sit back while the machine searches for your program.

Program notes

Lines	
40	POKE 359,60 slows down the listings. Also anything printed appears line by line on the screen.
50-60	Clears the screen and sets up titles.
70-160	Sets up variables.
170-280	And 380-480 lists programs in menu.
290-360	And 490-560 sets up the prompts and tests for input. If input is out of range, makes a short sound. POKE 259,57 speeds up the listings again and returns to page one or two as required.
370	On input N goes to the desired program line.
570-610	Set up prompts and loads item(1) on MENU.
630-1150	GOTO lines from input N(line 370) and clears the screen. Sets up the X factor, sends the program to

the GOSUB routine; on return from GOSUB clears the screen, prints titles and loads program.

2000-2100 GOSUB routine.

2020-2030 Sets up the prompts and waits for response.

2040-2070 Returns TIMER to 0, switches recorder motor on then switches motor off again when TIMER=X.

2080-2110 Sets up prompts, waits for response returns to required line and carries out loading.

```
10 REM******DIRECTORY******
20 REM WITH FAST/FORWARD ROUTINE
30 REM M.MCPARTLIN NOV-83
40 POKE 359,60
50 CLS
60 PRINT@224, STRING$(32,CHR$(172)
);STRING$(12,"*");"DIRECTORY";STRI
NG$(11,"*");STRING$(32,CHR$(163))
70 FOR D=1 TO 1500:NEXT D:CLS
80 C$="PLEASE PRESS FAST FORWARD"
90 D$="ON THE TAPE RECORDER"
100 E$="THEN PRESS SPACEBAR"
110 F$="PLEASE PRESS PLAY BUTTON"
120 G$="ON TAPE RECORDER"
130 H$="THEN PRESS SPACEBAR"
140 P$="SORRY NOTHING LISTED YET"
150 J$="PLEASE WAIT"
160 C=195:D=198:E=232
170 CLS
180 PRINTSTRING$(14,"*");"MENU";ST
RING$(14,"*")STRING$(32,CHR$(163))
190 PRINT@75," "
200 PRINT"        ""1.GRAPHIC DEMO"
210 PRINT"        ""2.GRAPHIC DEMO"
220 PRINT"        ""3.GRAPHIC DEMO"
230 PRINT"        ""4.GRAPHIC DEMO"
240 PRINT"        ""5.CLOCK"
250 PRINT"        ""6.SPACE FOR NEW T
ITLES"
260 PRINT"        ""7.--------------"
270 PRINT"        ""8.--------------"
280 PRINT"        ""9.--------------"
290 PRINT"PLEASE SELECT ONE OF THE
 ABOVE"
300 PRINT"OR PRESS ENTER  FOR NEXT
 PAGE"
310 INPUT N
320 IF N=0THEN380
330 IFN>9THEN 340ELSE 360
340 SOUND200,4:POKE359,57
350 GOTO190
360 POKE359,60
370 ON N  GOTO570,620,650,680,710,
740,780,820,860,910,960,1000,1040,
1060,1080,1100,1120,1140
380 FORI=1088TO1479:POKEI,143:NEXTI
390 PRINT@75,"PAGE TWO"
400 PRINT"       ""10--------------"
410 PRINT"       ""11.--------------"
420 PRINT"       ""12.--------------"
430 PRINT"       ""13.--------------"
440 PRINT"       ""14.--------------"
450 PRINT"       ""15.--------------"
460 PRINT"       ""16.--------------"
470 PRINT"       ""17.--------------"
480 PRINT"       ""18.--------------"
490 PRINT"PLEASE SELECT ONE OF THE
 ABOVE"
500 PRINT"OR PRESS ENTER FOR PAGE
ONE
510 POKE 359,60
520 INPUT N
530 IF N=0THEN160 ELSE 540
540 IF N<10 OR N>18 THEN 550 ELSE
370
550 SOUND 200,4
560 POKE359,57:GOTO390
570 CLS:PRINT@C,F$,"    "G$,"    "H$
580 A$=INKEY$:IFA$=" "THEN 590 ELS
E 580
590 CLS:PRINT@D,"LOADING DEMO"
600 PRINT:PRINT@E,J$
610 SCREEN0,1:CLOAD
620 CLS:X=10:GOSUB2000
630 CLS:PRINT@D,"LOADING DEMO"
640 PRINT@E,J$:SCREEN0,1:CLOAD
650 CLS:X=20:GOSUB2000
660 CLS:PRINT@D,"LOADING DEMO"
670 PRINT@E,J$:SCREEN0,1:CLOAD
680 CLS:X=28:GOSUB2000
690 CLS:PRINT@D,"LOADING DEMO
700 PRINT@E,J$:SCREEN0,1:CLOAD
710 CLS:X=36:GOSUB2000
720 CLS:PRINT@D,"LOADING"
730 PRINT@E,J$:SCREEN0,1:CLOAD
740 CLS:X=44:PRINT@D,P$;
750 FOR M=1TO500:NEXT:GOTO170
760 CLS:PRINT@D,"LOADING "
770 PRINT@E,J$:SCREEN0,1:CLOAD
780 CLS:X=51:PRINT@D,P$;
790 FOR M=1TO500:NEXT:GOTO170
800 CLS:PRINT@D,"LOADING "
810 PRINT@E,J$:SCREEN0,1:CLOAD
820 CLS:X=60:PRINT@D,P$;
830 FOR M=1TO500:NEXT:GOTO170
840 CLS:PRINT@D,"LOADING "
850 PRINT@E,J$:SCREEN0,1:CLOAD
860 CLS:X=72:PRINT@D,P$;
870 FOR M=1TO500:NEXT:GOTO170
880 CLS: PRINT@D,"LOADING"
890 PRINT@E,J$
900 SCREEN0,1:CLOAD
910 CLS:X=84:PRINT@D,P$;
920 FOR M=1TO500:NEXT:GOTO170
930 CLS:PRINT@D,"LOADING"
940 PRINT@E,J$
950 SCREEN0,1:CLOAD
960 CLS:X=90:PRINT@D,P$;
970 FORM=1TO 500:NEXT:GOTO170
980 PRINT@E,J$
990 SCREEN0,1:CLOAD
1000 CLS:X=97:PRINT@D,P$;
1010 FOR M=1TO500:NEXT:GOTO170
1020 PRINT@E,J$
1030 SCREEN0,1:CLOAD
```

Continued on page 43

```
1040 CLS:X=103:PRINT@D,P$;
1050 FOR M=1TO500:NEXT GOTO170
1060 CLS:X=110:PRINT@D,P$;
1070 FOR=1TO500:NEXT:GOTO170
1080 CLS:X=109:PRINT@D,P$;
1090 FORM=1TO500:NEXT:GOTO170
1100 CLS:X=115:PRINT@D,P$;
1110 FORM=1TO500:NEXT:GOTO170
1120 CLS:X=121:PRINT@D,P$;
1130 FOR M=1TO500:NEXT:GOTO170
1140 CLS:X=127:PRINT@D,P$;
1150 FOR M=1TO500:NEXT :GOTO170
2000 REM FAST FORWARD SUBROUTINE
2010 REM -----------------------
2020 PRINT@C,C$,"    "D$,"    "E$
2030 A$=INKEY$:IFA$=" "THEN2040 EL
SE2030
2040 TIMER=0:MOTOR ON
2050 CLS:PRINT@E,J$
2060 PRINT@264,"SEARCHING"
2070 IF TIMER/50=X THEN2080 ELSE 2
070
2080 MOTOR OFF
2090 CLS:PRINT@C,F$,"    "G$," "H $
2100 A$=INKEY$:IF A$=" "THEN2110 E
LSE2100
2110 RETURN
```

Mash

From Ian Balshaw and Julian Chapman in Northampton

THIS PROGRAM is the revised version of Mash that appeared in the April 1984 edition of *Dragon User* (Open File, page 39). The idea is to safely land your damaged helicopter on the landing pads. Instructions are given with the program and the keys must be repeatedly pressed to control movement.

```
0 GOTO375
10 PMODE3,1:SCREEN1,0:PCLS
15 DRAW"BM0,192U52BM192,0R255"
20 DRAW"BM0,140E10R10E20U10E30F10E
10R10E10R10F10R30F10R30F10D10F10R2
0F15D82
30 CIRCLE(160,30),15
40 PAINT(150,30),2,4
50 PAINT(0,0),2,4
60 DRAW"BM24,70U20R6D10R4U10R6D20B
R10U20R10D20U10L10R10D10BR10R10U10
L10U10R10BD10D10BR10U20D10R10U10D2
0"
70 PAINT(110,110),1.4
80 PLAY"T4"
90 PLAY"O3"
100 PLAY"V16"
110 PLAY"L4"
120 PLAY"L1"
130 FORN=1TO2
140 PLAY"L4B-AB-A"
150 PLAY"B-AL2G"
160 PLAY"L4AGAG"
170 PLAY"AGL4.FL8A"
180 PLAY"L4GFGF"
190 PLAY"GFL4.EL8G"
200 PLAY"L4FEFE"
210 PLAY"FGL2A"
220 PLAY"L1A"
230 PLAY"L2.AL4C"
240 PLAY"DCDC"
250 PLAY"DL2CL4C"
260 PLAY"DCDC"
270 PLAY"DL2CL4C"
280 PLAY"ACDF"
290 PLAY"GFDC"
300 PLAY"L1D"
310 PLAY"L2.L4C"
320 NEXTN
330 PLAY"L1D"
340 PLAY"L2.L4C"
350 PLAY"ACDF"
360 PLAY"L2DL4DD"
370 PLAY"L2.D"
374 GOTO380
375 CLS:INPUT"TUNE <Y/N>";TU$:IFTU
$="Y" THEN 10 ELSE 380
380 REM
400 REM DECEMBER
410 REM
420 GOSUB2000
440 PMODE4,1:SCREEN1,1:PCLS
450 Z$="BM0,170;E20R4E4F11E4F8R10E
30F8E4F20D11R12E4F15R7E9R3E10F15R1
4D4R6E8E20F5R4"
460 E$="BM1,0;F8G1L1H4G3F1E1R1D1U1
R1U8BR3G4H1L1H1BD3R6U2E1R1E1BD3L2G
2L2"
470 DRAWE$
480 DIME(9,9)
490 GET(0,0)-(10,10),E,G
500 DRAWZ$
510 J$="BM4,1U2R2D2L2"
520 PAINT(0,192)
530 COLOR0,5
540 DRAW"BM0,170;D22R255U37"
550 COLOR5,0
560 X$="BM4,1;D1L1G2D1F2R2E2U1H2BD
6R1D1BL8R2U1R1"
570 DRAWX$
580 DIMI(9,9)
590 FU=255
600 DIMV(9,9)
610 GET(0,0)-(10,10),I,G
620 PUT(0,0)-(10,10),V,PSET
630 DRAWJ$:GET(0,0)-(10,10),I,G:PU
T(0,0)-(10,10),V,PSET
640 DRAW"BM1,1;D6U3R1BU3R1BR2D6R2U
6BR2R2L2D3R1L1D3R2BR2R2L2U6"
650 DRAW"BM18,1;R236D6L236U6":LINE
(20,3)-(FU,5),PSET,BF
660 FORC=0TO5
670 X=RND(245):Y=RND(110)+8
680 DRAW"BM"+STR$(X)+","+STR$(Y)+"
```

Continued on page 44

```
;BR2U6F4R10F2L15"
690 NEXTC
700 COLOR0,5
710 LINE(51,162)-(61,162),PSET
720 LINE(124,167)-(135,167),PSET
730 LINE(198,174)-(212,174),PSET
740 COLOR5,0
750 X=230:Y=9
760 S=5
770 W=1
780 FORN=0 TO S
790 GOTO920
800 A$=INKEY$:IFA$<>"" THEN GOSUB8
60
810 NEXTN
820 Y=Y+1
830 S=S-1
840 IFS<0 THEN S=0
850 GOTO780
860 IFFU=19 THEN RETURN
870 IFA$="A" THEN S=S+1:IFS=1 THEN
 S=2
880 IFS>10 THEN S=10
890 IFA$="S" THEN W=W-.1:IF W<0 TH
EN W=0
900 LINE(FU,3)-(FU,5),PRESET:FU=FU
-1
910 RETURN
920 IFA$<>"S" THEN W=W+.05
930 IFW>1 THEN W=1
940 X=X-W
950 IFX<1 THEN PUT(X,Y)-(X+10,Y+10
),V,PSET
960 IFPPOINT(X,Y+10)=5 OR PPOINT(X
+8,Y+10)=5 THEN990
970 PUT(X,Y)-(X+10,Y+10),I,PSET
980 GOTO800
990 X=INT(X):Y=INT(Y)
1600 IFY=152 OR Y=151 OR Y=156 OR
Y=163 THEN 1610 ELSE 1620
1610 IF X=50 OR X=51 OR X=124 OR X
=125 OR(X>197 AND X<203) THEN 1720
 ELSE 1620
1620 R$="YOU CRASHED! -YOUR PATIEN
T AND  AND CREW WERE KILLED"
1630 PUT(X,Y)-(X+10,Y+10),E,PSET
1640 PLAY"T25501"
1650 FORV=31 TO 0 STEP-1
1660 PLAY"V"+STR$(V)+"DACGEBFDA"
1670 NEXTV
1680 SCREEN0,0
1690 CLS
1700 PRINTR$
1710 GOTO1770
1720 PLAY"T28ABABABABBBAABABBBBGB
GB":GOTO1750
1740 SCREEN0,0
1750 CLS
1760 PRINT"WELLDONE YOU SAVED YOUR
 PATIENT"
1770 PRINT:PRINT"YOU HAD"FU-19"UNI
TS OF FUEL LEFT"
1780 FORN=0TO2500:NEXTN
1790 PRINT:PRINT:INPUT"WOULD YOU L
IKE TO TRY AGAIN";P$:IFP$="Y" THEN
 RUN
1800 CLS:END
2000 CLS3:PRINT"THE OBJECT OF THE
GAME IS TO SAVE YOUR PATIENT BY LA
NDING YOUR"
2100 PRINT"DAMAGED HELECOPTER ON T
HE LANDI-NG SPOTS"
2200 PRINT:PRINT"THERE IS A STORM
AND A GREAT    WIND"
2300 PRINT:PRINT"A TO THRUST AGAIN
ST THE STORM"
2400 PRINT:PRINT"S TO THRUST AGAIN
ST THE WIND"
2450 PRINT:PRINT"WATCH OUT FOR THE
 AIRCRAFTS "
2460 PRINT"THEY COULD HAVE MISSILE
S AND DE-STROY YOU.PRESS A KEY"
2600 IF INKEY$="" THEN 2600
2700 RETURN
```

Mower

From R Littlejohns in Suffolk

THE OBJECT of the game is to carefully steer your mower through the garden, whilst of course avoiding the mole hills. Worst of all your mower leaks oil which means you must collect oil from the carefully situated oil cans around the garden. Full instructions are included. To load the program tape CLOAD "MOWER".

Program notes

Lines	
10-80	Asks if instructions wanted.
90-190	Sets up variables and draws screen.
200	Prints and flashes "READY" five times.
210-420	Main loop.
220	Detects when no oil left.
240	Plays low oil warning when oil is less than 15 units.
270-310	Detects keys pressed.
430-470	Lose life routine.
480-600	No more lives left.
610-670	Stage complete.
680-860	Instructions.

Variables

L	Lives left.
O	Oil left.
U	Amount of mole hills.
TI	Counter.
M	Poke position on screen of mower.
MI	Direction of mower.
GR	Detects whether mower has hit anything or not.
K	Speed level.
TL	Timing loop to slow game down (for TL = I TO K: NEXT TL).

```
10 CLS
20 PRINT@13,"MOWER"
30 PRINT@45,STRING$(5,131)
40 PRINT@161,"DO YOU REQUIRE INSTRUCTIONS ??"
50 PRINT@205,"(Y/N)"
60 I$=INKEY$:IF I$="" THEN 60
```

```
70 IF I$="Y" THEN 680
80 CLS:PRINT@192,;:GOTO 830
90 L=4:O=50:U=14
100 PLAY"T255L255V20"
110 TI=0
120 CLS
130 FOR A=1 TO 15:POKE 1088+RND(416),159:NEXT
140 FOR A=1 TO 8+U:POKE 1088+RND(416),8:NEXT
150 FOR PB=1024 TO 1055:POKE PB,223:POKE PB+480,223:NEXT
160 FOR PB=1024 TO 1504 STEP 32:POKE PB,223:POKE PB+31,223:NEXT
170 PRINT@33,"score";:PRINT@45,"lives";:PRINT@55,"oil";
180 PRINT@50,L;
190 M=1263:M1=1
200 FOR TL=1 TO 5:PRINT@237,"READY!";:FOR T=1 TO 200:NEXT T:PRINT@237,"      ";:
FOR T=1 TO 200:NEXT T:NEXT TL
210 PRINT@58,O;
220 O=O-1:IF O=-1 THEN PLAY "T6L6O5BGECO4BGECO3BGECO2BGECO1BGET2L2C":PLAY "T255L
255":GOTO430
230 PLAY "C"
240 IF O=15 THEN PLAY "O2CBCBCBCBCBCBCBCBCBCBCB"
250 POKE M,99
260 PLAY "O1B"
270 A$=INKEY$
280 IF A$="^" THEN M1=-32
290 IF A$=CHR$(10) THEN M1=32
300 IF A$=CHR$(8) THEN M1=-1
310 IF A$=CHR$(9) THEN M1=1
320 TI=TI+1
330 POKE M,106
340 M=M+M1
350 GR=PEEK(M)
360 IF TI>370-U*2 THEN 610
370 IF GR=159 THEN PLAY "O5BABABABABABABABABABAB":O=O+25:GOTO400
380 IF GR=106 THEN 400
390 IF GR<>96 THEN POKE M,255:SOUND 4,30:GOTO 430 ELSE SC=SC+10:PRINT@38,SC;
400 POKE M,99
410 FOR TL=1 TO K:NEXT TL
420 GOTO 210
430 L=L-1:IF L=-1 THEN 480
440 IF O=-1 THEN O=50
450 PRINT@50,L;
460 POKE M,GR
470 GOTO 190
480 POKE M,255
490 PLAY "O5CCGCGCGCGGGCGCGCGCCBBDBDBDBDGDGDGCGEGDDFFGFGGGGGGGGGGGGGGGGG"
500 FOR TL=1 TO 1000:NEXT TL
510 CLS
520 PRINT@13,"MOWER"
530 PRINT
540 IF O=-1 THEN PRINT "YOUR MOWER SEIZED UP BECAUSE OF LACK OF OIL !!!"
550 IF L=-1 THEN PRINT "YOU HAVE NO MORE MOWERS LEFT !!!"
560 PRINT"your"CHR$(128)"score";SC;
570 SC=0
580 PRINT
590 PRINT:PRINT"PRESS A KEY FOR ANOTHER GO"
600 IF PEEK(337)=255 THEN 600 ELSE PRINT@320,;:GOTO 830
610 FOR G=1 TO 14:PRINT@234,"STAGE COMPLETE";:SOUND G*10,3:PRINT@234,STRING$(14,
143);:SOUND 76,3:NEXT:SOUND G*8,8:CLS
620 PRINT@13,"MOWER"
630 PRINT:PRINT"YOUR SCORE";SC;
640 PRINT:PRINT"THE LEVEL OF DIFFICULTY WILL NOWINCREASE !!!"
650 U=U+10+RND(5):O=50:K=1
660 PRINT:PRINT"PRESS A KEY TO CONTINUE"
670 IF INKEY$="" THEN 670 ELSE 110
680 CLS
690 PRINT@13,"MOWER"
700 PRINT@45,STRING$(5,131)
710 PRINT@66,"SPRING IS IN THE AIR AND YOU    DECIDE TO GET YOUR RUSTY OLD    MO
WER OUT AND CUT THE GRASS."
720 PRINT:PRINT"unfortunately YOU FIND IT HAS ANOIL LEAK WHICH MEANS YOU HAVE TO
GET TO  THE OIL  CANS  SPACED ATREGULAR POINTS AROUND THE GARDENIN ORDER TO REFI
LL WITH OIL."
730 PRINT
740 PRINT"WORST OF ALL  YOUR  LITTLE FURRYFRIENDS THE MOLES  HAVE  BEEN ATWORK D
IGGING LOTS OF HOLES !!!!!";
750 PRINT@486,"HIT A KEY TO CONTINUE";
760 IF INKEY$="" THEN 760
770 CLS
780 PRINT"items in garden"
790 PRINT:PRINTCHR$(159)"-25 EXTRA OIL UNITS"
800 PRINT:PRINTCHR$(223)"-GARDEN WALL LOSE ONE MOWER"
810 PRINT:PRINT"h-MOLE HILL LOSE ONE MOWER"
820 PRINT:PRINT"TO CHANGE DIRECTION OF MOWER USEARROW KEYS"
830 PRINT:PRINT"INPUT SPEED LEVEL 0-FAST                     50-SLOW"
840 INPUT K
850 PRINT@484,"HIT A KEY TO START GAME";
860 IF INKEY$="" THEN 860 ELSE 90
```

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Dragon Answers

Floppy format

I RECENTLY purchased a Dragon 64, and am trying to connect it to a DEC Rainbow via its RS232C port so that I can use the floppy storage of the Rainbow.

Can you tell me what is the character format required by the Dragon 64 after the commands DLOAD or DLOADM have been executed?

After five characters, the Dragon responds with "I/O ERROR".

M J Ward
Weaverham
Cheshire

THE DLOAD command is, unfortunately, completely undocumented, although it is potentially very useful. In fact, the format for DLOAD (and DLOADM) is exactly the same as for CLOAD (and CLOADM).

The very same ROM routines are used except that the channel used is the RS232 port (channel −3 internally). Assuming you want to use DLOADM (as this is the most obvious way of loading data) the format required for a block is 128 bytes of $55, $3C, a block type byte, a block length byte, up to 255 data bytes, a checksum byte, $55.

In addition, the first block read must be a standard name-file block as used in the cassette system.

PMODE problem

I HAVE owned a Dragon 32 for nearly a year and am very pleased with its performance. However, there are slight drawbacks. In hi-res, colours cannot be obtained in PMODE4. Also, text cannot be printed on to the hi-res screen.

I have, however, heard of a mode 24. This, I believe, means that all nine colours and text can be used on the screen in hi-res. Could you please give me more information on this.

Roger Payne
Alcester
Warwickshire

THE MODE that I think you mean is called Semigraphics 24. This allows normal text to be displayed as well as graphics on a grid



of 64×192 in all eight colours. Unfortunately, this mode is not supported from Basic; to enter and control it you have to use POKE. The following will enter Semigraphics 24, with the top left of the screen starting at address 1024:

```
POKE &HFFC0,0 : POKE &HFFC3,0 : POKE &HFFC5,0
```

To display a character on the screen its code must be poked to 12 column consecutive addresses, so to display "A" in the top left-hand corner you would use:

```
FOR I=0 to 11 : POKE 1024+I*32,ASC("A") : NEXT
```

To display graphics, the code of the graphics character must be poked into one address (for example, to underline the A in yellow use: POKE 1024+12*32, 159).

String error?

HAVE I found a BASIC ROM weakness/error?

When creating a string data file, some of the data was required within double quotes characters (CHR$(34)). As long as the first character of the data was not a double quote, there was no problem.

However, when the data field commenced with a double quote character, although apparently saved without problem, reading the data back in gave an FD error.

I have never seen any restriction on the contents of a string field. Any Answers?

Pam D'Arcy
High Wycombe
Bucks

YOU have raised an interesting point here, and are quite correct in thinking that the data is saved to tape without alteration.

However, the problem arises when reading this back into a program using INPUT# −1. The same ROM routines that are used for an input from the keyboard are called, except that data is taken from the cassette buffer.

The assignment routine looks for an optional opening quote as the first significant character in the field. If one is found, it is assumed to mark the start of a special string (containing commas, colons and so on) and does not form part of the string itself.

The FD error is caused when the closing quote is read — this is assumed to mark the end of the string and a CHR$(13) is expected immediately after this. If any other character is found then the data is faulty.

There is no simple way around this problem except to ensure that quotes (if they must be included in a string) do not form the first significant character in the line. Alternatively, substitute another character for the quote before saving and convert back after loading.

Missing pieces

I AM currently writing a program which involves using the "GET" and "PUT" commands, but am experiencing difficulties. I am familiar with keeping the picture or object within the array dimension (DIM) but the trouble arises when I try to use "INKEY$" and replace the co-ordinates with variables such as "X". The object on the screen will move correctly about twice and then start to miss quite large parts out.

Could you please write a small program for me which moves, say a small square around the screen when you press the appropriate key, stop when you let go and will not blank out or interfere with the background.

Carl Crowther
Halifax
W Yorks

An example program might look something like this:

```
10 PMODE 3,1:COLOR 2,1:PCLS:SCREEN1,0
20 LINE (2,2)-(19,19),PSET,BF
30 DIM A(13):GET(0,0)-(22,22),A,G
40 PCLS:X=128:Y=96
50 PUT (X,Y)-(X+22,Y+22),A,PSET
60 I$ = INKEY$
70 X=X+(I$=CHR$(8))*2-(I0=CHR$(9))*2
80 Y=Y+(I$=CHR$(94))*2-(I$=CHR$(10))*2
90 GOTO 50
```

Note that this program does not check whether the object reaches the edge of the screen, but merely demonstrates the use of the GET and PUT commands which are amongst the most powerful graphics commands available on the Dragon.

Unwanted saving

LIVING in Belgium and being the owner of a Dragon, I soon discovered the problem of obtaining information and software.

I tried to link an Epson MX-80 F/T printer to my Dragon using a "centronics" printer cable.

Everything worked, but the entire LLIST was printed on the same line. It's nice to save paper but . . . what must I do?

There are no switches on the printer, so could you please tell me if the Epson works with the Dragon?

Louis Flament
Belgium

THERE is a provision in the Dragon Basic for problems like this one with printers. The following should be typed when you first turn on the computer:

```
POKE 155, 80
POKE 154, 64
POKE 328, 0
POKE 330, 2
```

This tells the computer to send both a carriage return and a line feed code at the end of every line printed. On some printers it may not be necessary to use the last poke command.


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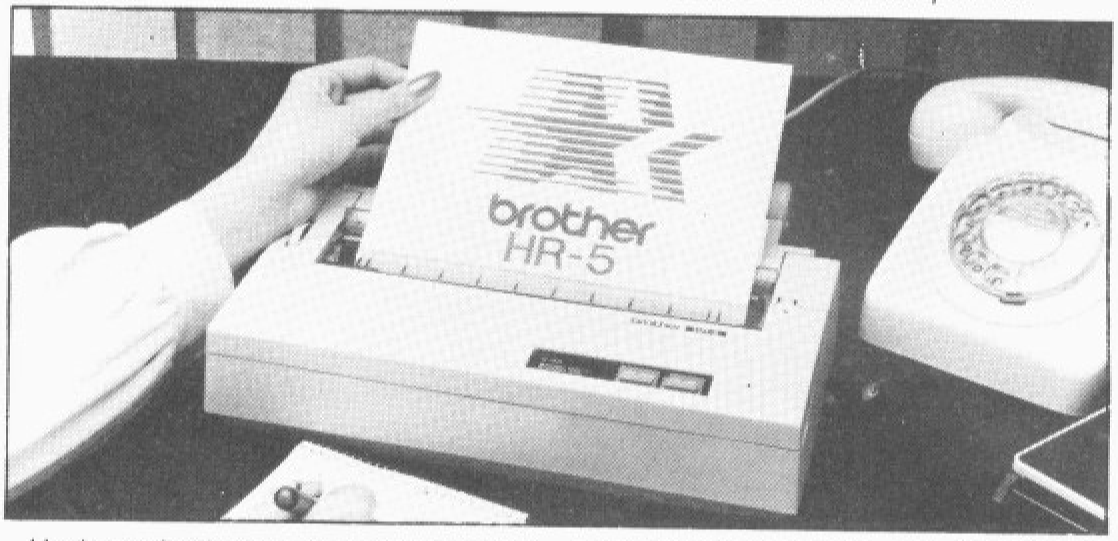
ADVERTISERS INDEX

Competition Corner

Answers to Competition Corner, *Dragon User*, 12/13 Little Newport Street, London WC2R 3LD

Printer power

Answer Gordon Lee's quiz to win Brother's thermal printer



THE AMAZING popularity of the Rubik Cube has brought in its wake an interest in a diversity of similar puzzles — double cubes, Rubik tetrahedra, larger orders of cubes, computer versions (*Dragon User* March '84) and, no doubt in the future, the four-dimensional cube is not far away.

Along with the actual puzzles themselves, comes a branch of mathematical theory which, for want of a better name, can be termed Rubik-cubology. The fundamental question of Rubik-cubology might well be: "How many different arrangements are possible on the Rubik cube?" To answer this, consider the cube.

Pieces

It comprises eight corner pieces,12 edge pieces and six centre pieces. Now each of the eight corner pieces can be placed at the eight possible corner positions on the cube, so there is a total of eight! (factorial eight) ways in which this can be done. Further, each of these corner pieces can be fitted into one of three orientations in each given corner. If you have a dismantled Rubik cube to hand you can easily see how this works. So our eight! ways of arranging the corners must be further multiplied by 3^8 to take into account this rotation.

Similarly, the 12 edge pieces can be fitted into their respective vacant spaces in 12! ways. These pieces too, can be placed in one of two different orientations, so we have to multiply 12! by $2^{1}2$. Thus, our grant total will be $8! * 3^8 * 12! * 2^{12}$. This gives us 519024039293878272000 — the total number of ways in which the cube can be re-assembled. Who would have thought that such a gigantic number could relate to a few pieces of plastic?

You may have wondered why no account has been taken of the blocks which occur in the central position on each face of the cube. In fact, no matter how the cube is twisted these six blocks always remain stationary with respect to one another. This may be difficult to imagine, but if you have dismantled a cube, you will find that these six blocks are fitted to a central axis, around which all the other blocks move, and their relative position to each other is fixed and remains constant.

Having arrived at our grand total, it might be supposed that any one of these positions could arrive during use. This is not so, as it has been found that only one twelfth of the positions can possibly occur during actual play. Even so, this still represents an enormous number of possibilities. In fact, there exist 12 completely different "cycles" each containing some 43252003274489856000 positions, and although it is possible to arrive at any position within each particular "cycle", it is impossible to move from one "cycle" to the next. For this reason it is advisable when re-assembling the cube to assemble it in its completed position, otherwise if it is put together at random, there will only be one chance in 12 that the puzzle can ultimately be solved.

This month's competition concerns Professor Cubik and Professor Rube, those learned experts of cubology who have just announced plans for the first Rubik Cube Olympics, which they hope will take place somewhere in the United States.

At first, there was some difficulty in deciding on the venue, but, following the policy that in cubology all factors should, where possible, have cubic connections, only those States which could be said to be "cubic" were considered.

Substitute

For example, by substituting digits for the letters of the name "Utah", the professors were able to find 4096 — the cube of 16 — each different letter being represented by a different digit. Similarly, "Nevada" is also a possibility — this time with 157464 — the cube of 54. Note that here the fourth and sixth digits are the same to match up with the two "A's" in Nevada, the other digits being different.

As a guide, only those States with names having nine letters or less, and consisting of one word were considered. However, it was pointed out that such Olympics could only be held during a "cubic" year, so the plans have had to be delayed until 2197, the next such date! **But which States were on the Professors' list?**

Prize

IF YOU'VE always wanted to add a printer to your Dragon — now's your chance. Brother is offering its HR-5 thermal transfer printer to the winner of this month's competition.

The HR-5 gives users a wide range of options: regular, condensed or extended typefaces; mains or battery operation; and A4 or roller paper. A dot matrix model, the printer operates at 30 characters a second over 80 columns — and can produce uni-directional graph and chart images together with bi-directional text.

Rules

TO WIN this month's prize you must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. Please do not send in a cassette containing the answer. As a tie-breaker complete the following sentence in 15 words or less: "I want to add a Brother printer to my Dragon because . . ."

Your entry must arrive at *Dragon User* by the last working day of July. The winner and the solution to the puzzle will be published in our October issue. Entries will not be acknowledged and we cannot enter into correspondence on the result. You may only enter the competition once.

April winner

THE WINNER of April's competition and recipient of a Seikosha printer from DRG Business Systems is Roger Ensling of Alveston in Bristol.

Roger was one of the few people who correctly answered that cubes of sides 2, 4, 5 and 11 inches produce 764 painted and 764 unpainted unit cubes giving a total of 1,528 small cubes from 4 large cubes.

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